PEUGEOT

405 (petrol)

1988 to 1990

1580 cc □ 1905 cc

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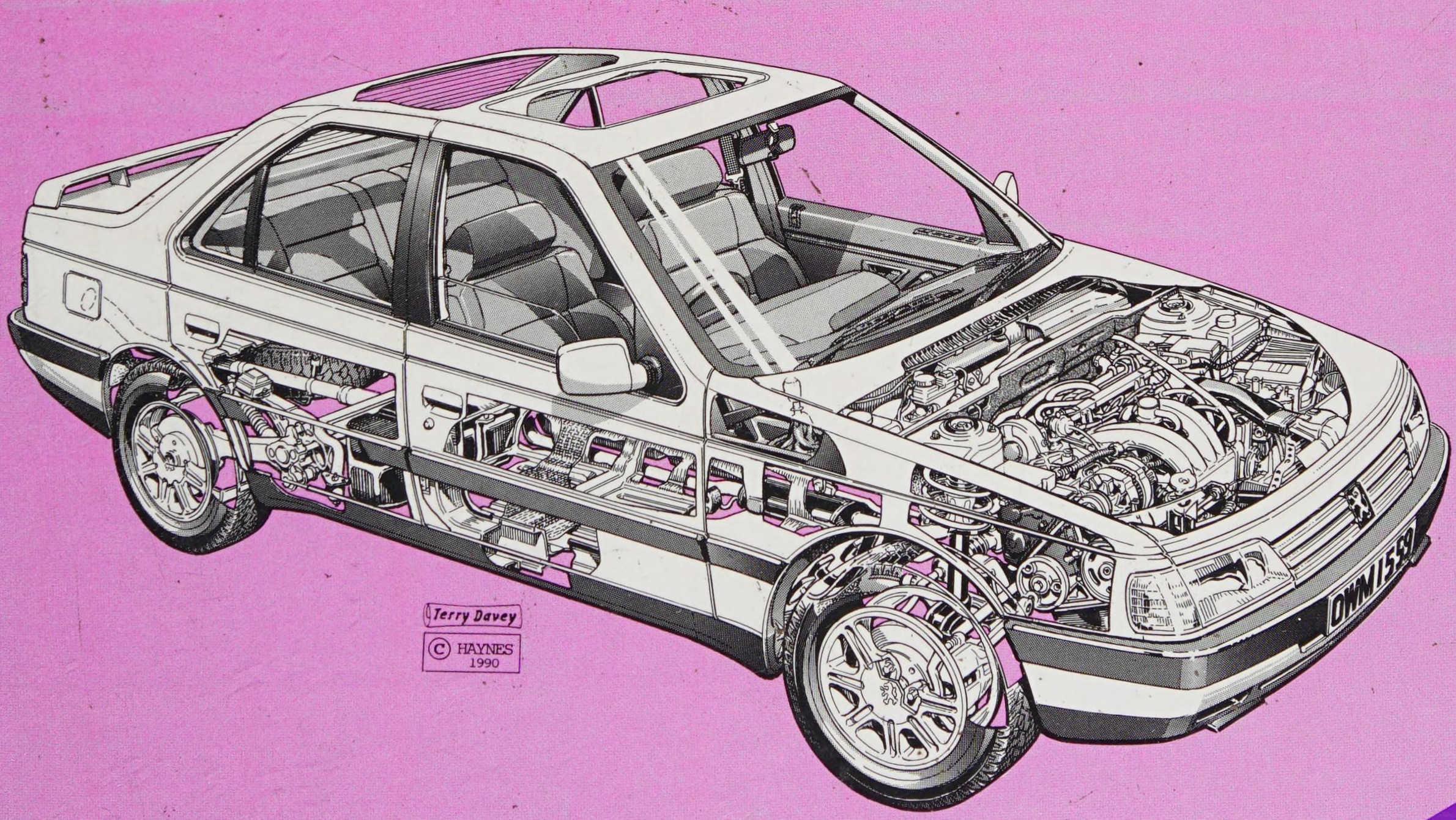
THE BOOK

Owners Workshop Manual



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Peugeot 405 Owners Workshop Manual

Colin Brown

Models covered
Peugeot 405 Saloon and Estate models;
GE, GL, GR, GRi, SRi, GTX and Mi16
1580 cc and 1905 cc petrol engines

Does not cover four-wheel-drive, Diesel engine or catalyst-equipped models

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Peugeot 405 SRi

Peugeot 405 GTX Estate

About this manual

Its aim

The aim of this manual is to help you get the best value from your vehicle. It can do so in several ways. It can help you decide what work must be done (even should you choose to get it done by a garage), provide information on routine maintenance and servicing, and give a logical course of action and diagnosis when random faults occur. However, it is hoped that you will use the manual by tackling the work yourself. On simpler jobs it may even be quicker than booking the car into a garage and going there twice, to leave and collect it. Perhaps most important, a lot of money can be saved by avoiding the costs a garage must charge to cover its labour and overheads.

The manual has drawings and descriptions to show the function of the various components so that their layout can be understood. Then the tasks are described and photographed in a step-by-step sequence so that even a novice can do the work.

Its arrangement

The manual is divided into twelve Chapters, each covering a logical sub-division of the vehicle. The Chapters are each divided into Sections, numbered with single figures, eg 5; and the Sections into paragraphs (or sub-sections), with decimal numbers following on from the Section they are in, eg 5.1, 5.2, 5.3 etc.

It is freely illustrated, especially in those parts where there is a detailed sequence of operations to be carried out. There are two forms of illustration: figures and photographs. The figures are numbered in sequence with decimal numbers, according to their position in the Chapter – eg Fig. 6.4 is the fourth drawing/illustration in Chapter 6. Photographs carry the same number (either individually or in related groups) as the Section or sub-section to which they relate.

There is an alphabetical index at the back of the manual as well as a contents list at the front. Each Chapter is also preceded by its own individual contents list.

References to the 'left' or 'right' of the vehicle are in the sense of a person in the driver's seat facing forwards.

Unless otherwise stated, nuts and bolts are removed by turning anti-clockwise, and tightened by turning clockwise.

Vehicle manufacturers continually make changes to specifications and recommendations, and these, when notified, are incorporated into our manuals at the earliest opportunity.

This manual is not a direct reproduction of the vehicle manufacturers' data, and its publication should not be taken as implying any technical approval by the vehicle manufacturers or importers.

Whilst every care is taken to ensure that the information in this manual is correct, no liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in, or omissions from, the information given.

Project vehicles

The project vehicles used in the preparation of this manual, and appearing in many of the photographic sequences, were a Peugeot 405 GL 1580 cc with XU52C engine, and a Peugeot 405 GTX Estate with XU9J2 engine.

Introduction to the Peugeot 405

The Peugeot 405 model range was introduced into the UK in January 1988 in Saloon form only.

Available with 1.6 and 1.9 litre carburettor, or 1.9 litre fuel-injected engines with five-speed manual gearbox as standard, all models have front- wheel-drive with all round independent suspension.

Automatic transmission models were introduced in April 1988.

In July 1988 came the sporty Mi 16 version with its 1.9 litre double overhead cam, 16-valve engine, uprated gearbox, suspension and an ABS braking system to match its power.

Estate car versions were introduced in October 1988.

Since its introduction, the 405 range has continually been developed. All models have a high trim level, which is very comprehensive in the upper model range.

General dimensions, weights and capacities

Dimensions

Overall length:	
Saloon	4513 mm (178 in)
Estate	4398 mm (173 in)
Overall width:	
Saloon	1716 mm (68.0 in)
Estate	1704 mm (67.0 in)
Overall height:	
Saloon	1406 mm (55.0 in)
Estate	1445 mm (57.0 in)
Front track:	
All models	1450 mm (57.1 in)
Rear track:	
All models	1443 mm (65.8 in)
Wheelbase:	
All models	2669 mm (105.0 in)

Weights

Saloon models:	
GE, GL and GR	1020 kg (2249 lb)
GTX, GRi and SRi	1040 kg (2293 lb)
Mi 16	1110 kg (2447 lb)
Estate models:	
GE, GL and GR (manual gearbox)	1060 kg (2337 lb)
GL and GR (automatic transmission)	1090 kg (2403 lb)
GTX (manual gearbox)	1080 kg (2381 lb)
GTX (automatic transmission)	1110 kg (2447 lb)
Maximum towing weight (with unbraked trailer):	
Saloon models:	
GE, GL and GR	510 kg (1124 lb)
GTX, GRi and SRi	520 kg (1146 lb)
Mi 16	555 kg (1223 lb)
Estate models:	
GE, GL and GR (manual gearbox)	530 kg (1168 lb)
GL and GR (automatic transmission)	545 kg (1201 lb)
GTX (manual gearbox)	540 kg (1190 lb)
GTX (automatic transmission)	555 kg (1223 lb)
Maximum towing weight (with braked trailer):	
All models except Mi 16	1200 kg (2646 lb)
Mi 16	1000 kg (2205 lb)
Maximum roof rack load:	
Saloon models (all)	75 kg (165 lb)
Estate models (all)	75 kg (165 lb)

Capacities

Engine (including filter):	
All models except Mi 16	5 litres (8.8 pints)
Mi 16	5.3 litres (9.3 pints)
Transmission:	
Manual gearbox	2.0 litres (3.5 pints)
Automatic transmission:	
Drain and refill	2.4 litres (4.2 pints)
After overhaul	6.2 litres (11.0 pints)
Cooling system:	
All except Mi 16	6.6 litres (11.6 pints)
Mi 16	7.2 litres (12.7 pints)
Power steering system	0.65 litres (1.1 pints)
Fuel tank	70 litres (15.4 gallons)

Jacking, towing and wheel changing

Jacking

The jack supplied with the vehicle is designed only for wheel changing and must not be used for general maintenance, especially where this involves working underneath the vehicle.

For general maintenance, the use of a small hydraulic trolley-jack and axle stands are the safest alterative.

To raise the front of the vehicle, position the trolley-jack under the front subframe with a block of wood between the jack head and the subframe. Alternatively, the front cross member can be used, but a block of wood 100 x 100 x 780 mm (4 x 4 x 30 in) will be required between the jack and the frame.

Raise the vehicle to the required height, then insert axle stands under the front wheel changing jacking points and lower the vehicle onto the axle stands.

Note: *Some axle stands have turned-up ends on the supporting cradle and care must be exercised when the vehicle is lowered onto the stands; if these turned-up ends contacted the sill panels they would cause damage.*

The procedure for raising the rear of the vehicle is as described for the front, using either the tubular suspension crossmember, for which a shaped block of wood approximately 100 mm (4.0 in) long will be required, or the rear panel using a 150 x 150 x 1200 mm (6 x 6 x 47 in) block of wood. Position the axle stands under the rear wheel changing jacking points.

Note: *When using the tubular suspension crossmember, care should be exercised that the block of wood does not contact the suspension torsion bars.*

To lower the vehicle from axle stands, reverse the raising process.

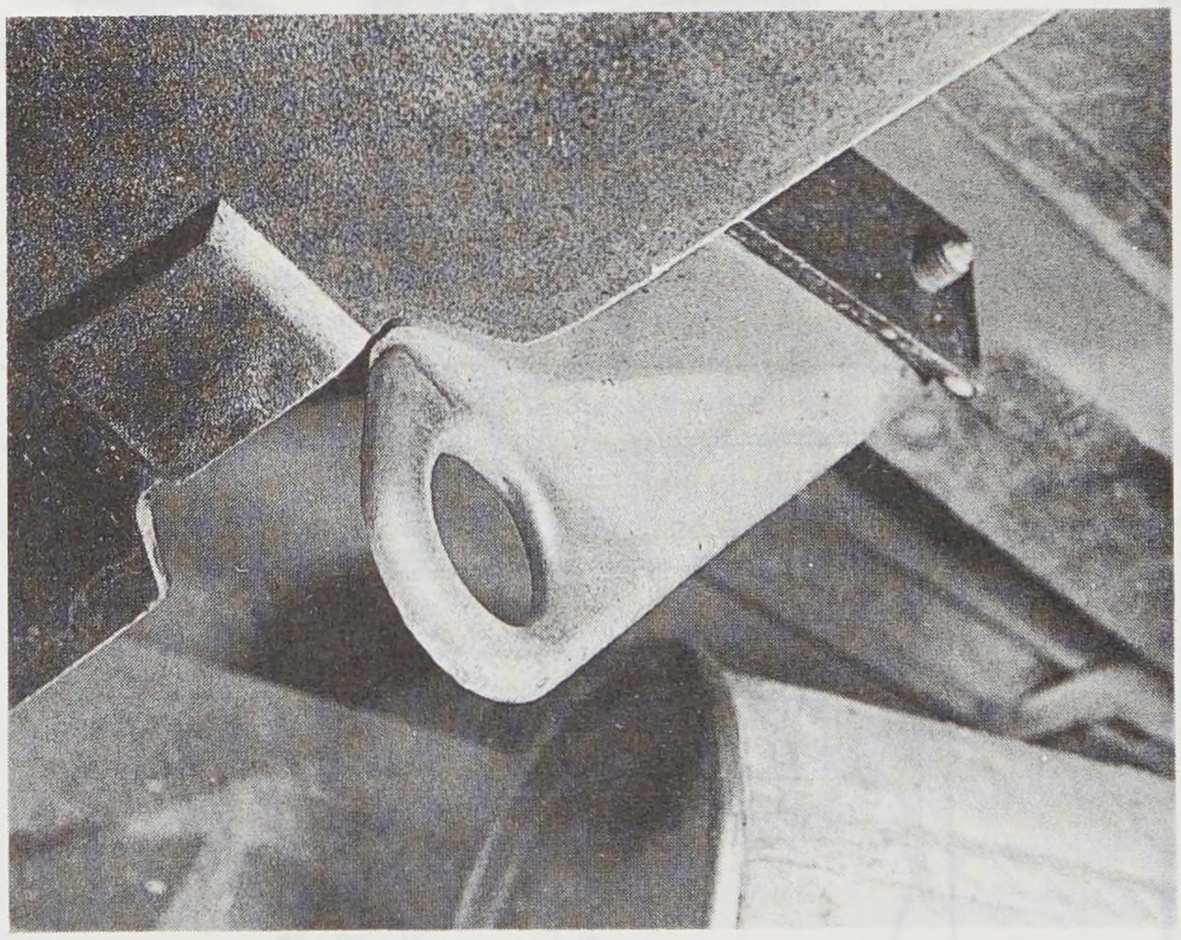
Towing

Front and rear towing eyes are provided which also double as tie-down points (photos).

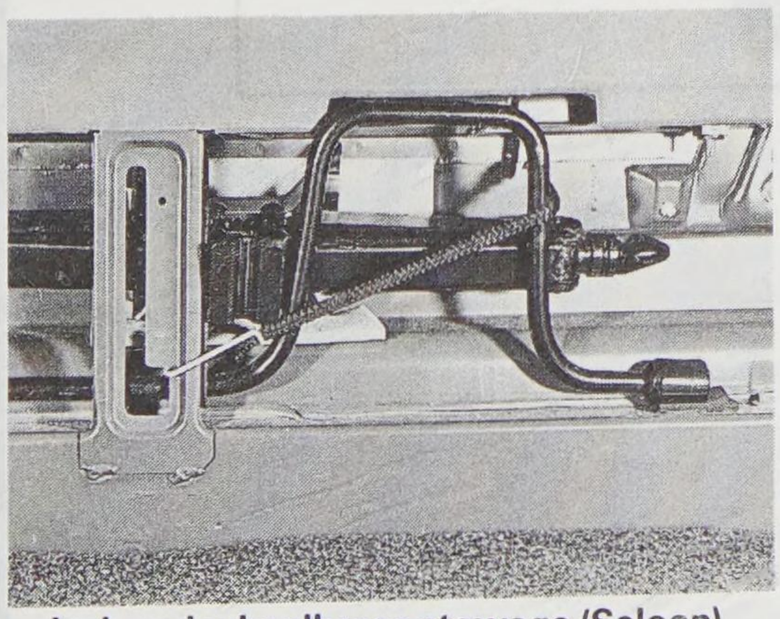
The vehicle should not be towed for more than 50 km (30 miles) or in excess of 50 km/h (30 mph).

These restrictions apply only where the vehicle is being towed with

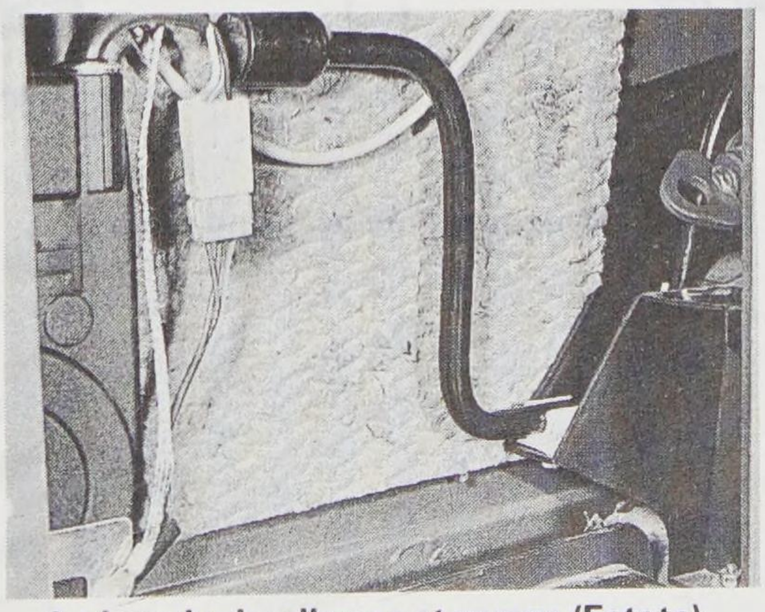
Front towing eye



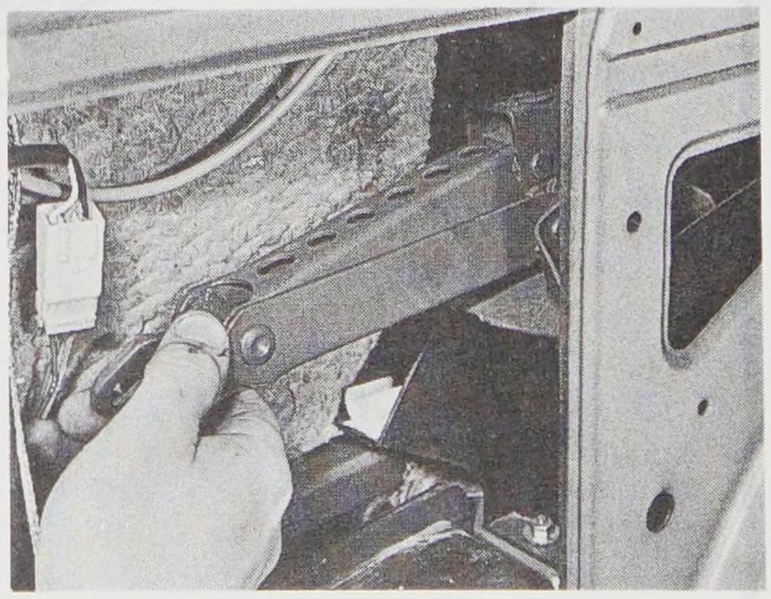
Rear towing eye



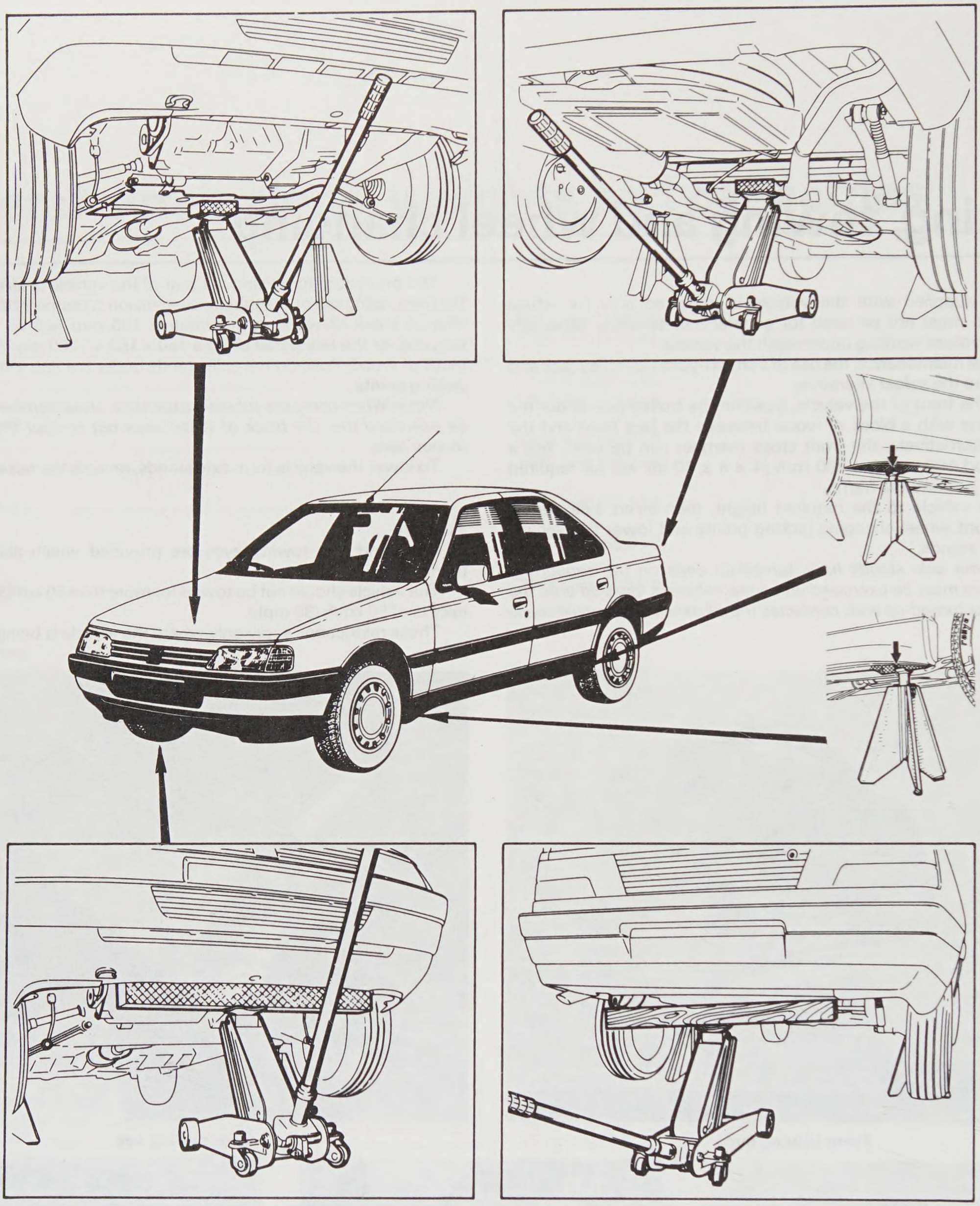
Jack and wheelbrace stowage (Saloon)



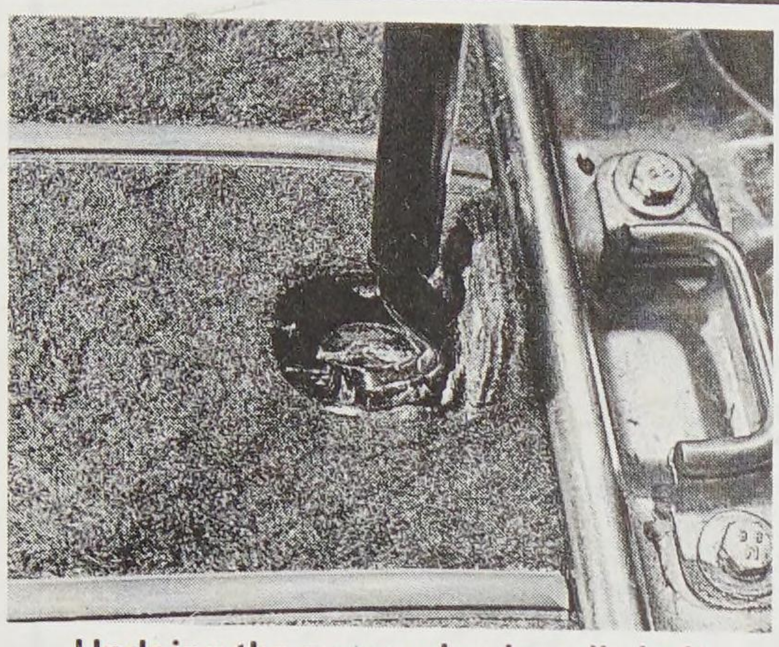
Jack and wheelbrace stowage (Estate)



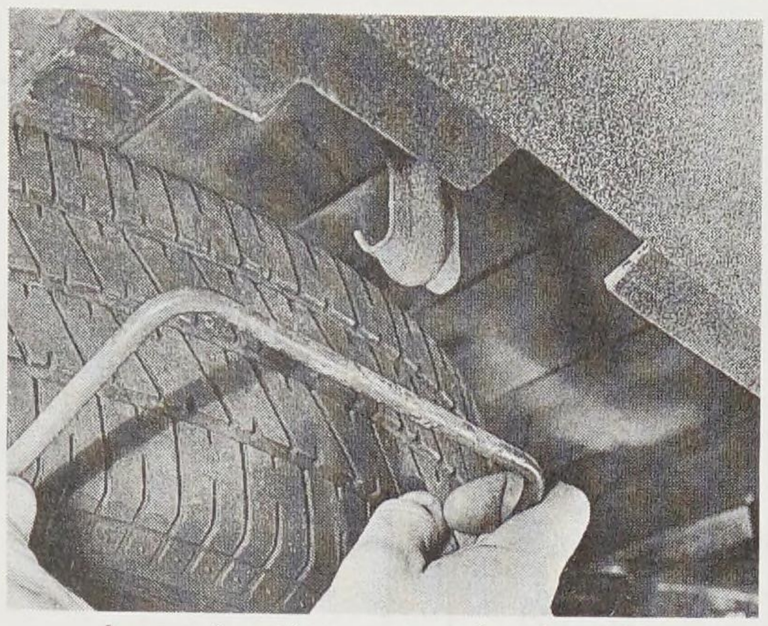
Removing the jack from its storage



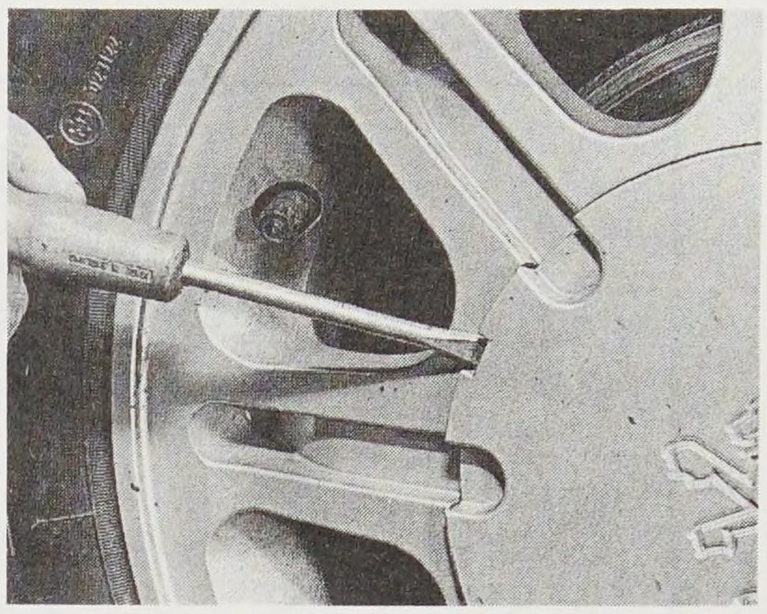
Showing vehicle jacking points



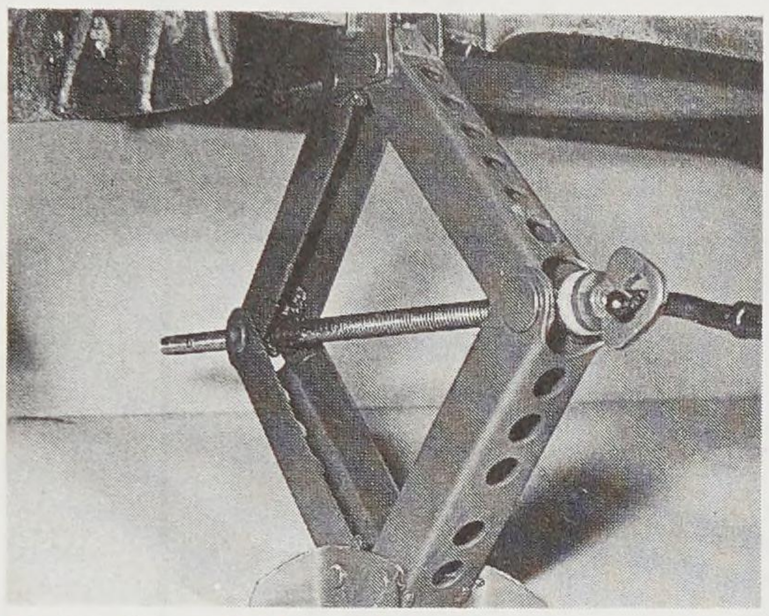
Undoing the spare wheel cradle bolt



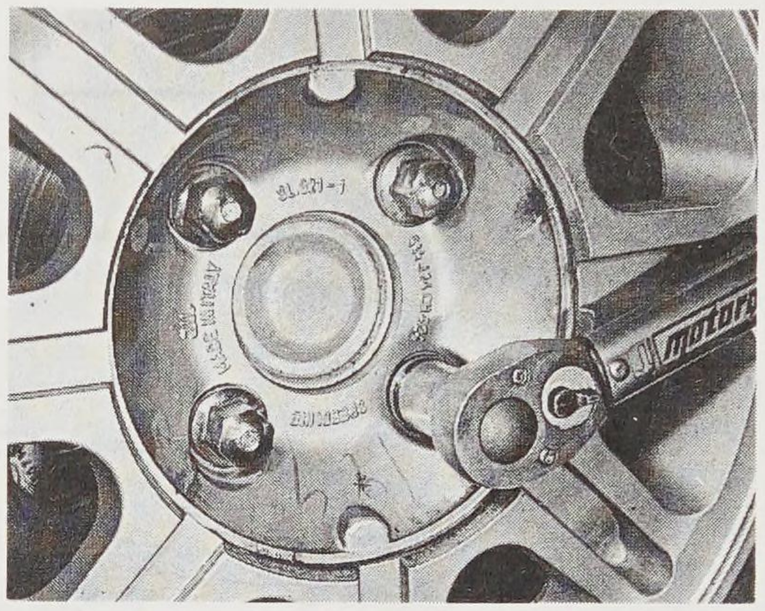
Lowering the spare wheel cradle



Removing a wheel trim



Using the vehicle jack to raise the vehicle



Tightening the roadwheel bolts

all four wheels on the ground. Where an official towing vehicle is being used and the front wheels are raised off the ground, be guided by the towing crew members.

Wheel changing

Position the vehicle on firm level ground, apply the handbrake and engage first or reverse gear. Open the boot/tailgate and take out the jack and wheel-brace. Unscrew the spare wheel cradle retaining bolt using the wheel-brace. Lift the cradle to disengage the hook, then lower it and remove the spare wheel (photos).

Using the hooked end of the wheel-brace, the special tool clipped to it, or a screwdriver, remove the wheel trim (photo).

Loosen the wheel bolts on the wheel to be removed by one turn only. Position the jack head under the jacking point nearest to the wheel to be removed. Locate the wheel-brace in the jack and raise the jack until it contacts the jacking point. Check its contact point, then raise the vehicle until the wheel is clear of the ground. Using the reverse end of the wheel-brace, remove the wheel bolts and remove the wheel. Fit the spare wheel and hand-tighten the bolts (photo).

Lower the vehicle to the ground and remove the jack.

Tighten the wheel bolts fully using the wheel-brace, refit the wheel trim and stow all equipment into the vehicle.

As soon as is practicable after the wheel change, have the puncture repaired and check the torque loading of the wheel bolts (photo).

Buying spare parts and vehicle identification numbers

Buying spare parts

Spare parts are available from many sources. Peugeot have many dealers throughout the country, and other dealers, accessory shops, and motor factors will also stock some spare parts suitable for Peugeot cars. Our advice regarding spare part sources is as follows:

Officially appointed vehicle main dealers – This is the best source for parts which are peculiar to your car and are not generally available (eg complete cylinder heads, internal transmission components, badges, interior trim etc). It is also the only place at which you should buy parts if your vehicle is still under warranty. To be sure of obtaining the correct parts it will always be necessary to give the storeman your vehicle engine and chassis number, and if possible, to take some 'old' parts along for positive identification. Remember that many parts are available on a factory exchange scheme – any parts returned should always be clean! It obviously makes good sense to go straight to the specialists on your car for this type of part for they are best equipped to supply you.

Other dealers and auto accessory shops – These are often very good places to buy materials and components needed for the maintenance of your car (eg oil filters, spark plugs, bulbs, fanbelts, oils and greases, touch-up paint, filler paste, etc). They also sell general accessories, usually have convenient opening hours, charge lower prices and can often be found not far from home.

Motor factors – Good factors will stock all of the more important components which wear out relatively quickly (eg clutch components, pistons, valves, exhaust systems, brake cylinders/pipes/hoses /seals/shoes and pads etc). Motor factors will often provide new or reconditioned components on a part exchange basis – this can save a considerable amount of money.

Vehicle identification numbers

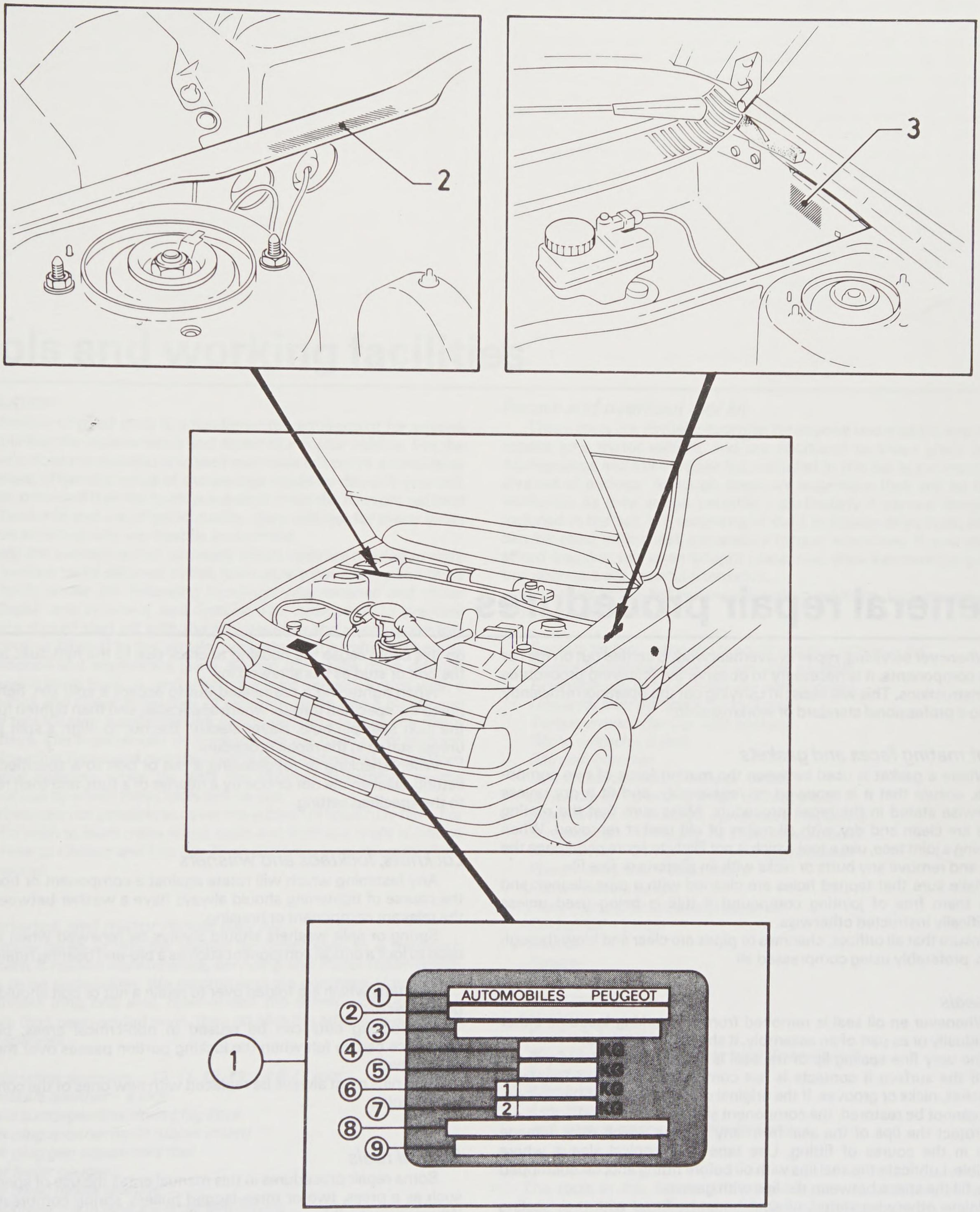
Modifications are a continuing and unpublicised process in vehicle manufacture. Spare parts manuals and lists are compiled on a numerical basis, the individual vehicle numbers being essential to identify correctly the component required.

The vehicle identification plate is riveted to the top of the front cross panel and contains the following information:

1 *Manufacturer's name*
2 *EC or National acceptance number (certain countries only)*
3 *Vehicle identification number (VIN) – contains seventeen characters*
4 *Gross vehicle weight*
5 *Kerb weight*
6 *Maximum front axle weight*
7 *Maximum rear axle weight*
8 *Blank*
9 *Additional information (version, type etc)*

The vehicle identification number is also stamped into the engine bulkhead cross panel.

The vehicle paint colour code is stamped into the left-hand inner wing panel.



Location of Vehicle Identification Plates

1 Vehicle identification plate (see text) *2 Vehicle identification number* *3 Vehicle paint colour code*

General repair procedures

Whenever servicing, repair or overhaul work is carried out on the car or its components, it is necessary to observe the following procedures and instructions. This will assist in carrying out the operation efficiently and to a professional standard of workmanship.

Joint mating faces and gaskets

Where a gasket is used between the mating faces of two components, ensure that it is renewed on reassembly, and fit it dry unless otherwise stated in the repair procedure. Make sure that the mating faces are clean and dry with all traces of old gasket removed. When cleaning a joint face, use a tool which is not likely to score or damage the face, and remove any burrs or nicks with an oilstone or fine file.

Make sure that tapped holes are cleaned with a pipe cleaner, and keep them free of jointing compound if this is being used unless specifically instructed otherwise.

Ensure that all orifices, channels or pipes are clear and blow through them, preferably using compressed air.

Oil seals

Whenever an oil seal is removed from its working location, either individually or as part of an assembly, it should be renewed.

The very fine sealing lip of the seal is easily damaged and will not seal if the surface it contacts is not completely clean and free from scratches, nicks or grooves. If the original sealing surface of the component cannot be restored, the component should be renewed.

Protect the lips of the seal from any surface which may damage them in the course of fitting. Use tape or a conical sleeve where possible. Lubricate the seal lips with oil before fitting and, on dual lipped seals, fill the space between the lips with grease.

Unless otherwise stated, oil seals must be fitted with their sealing lips toward the lubricant to be sealed.

Use a tubular drift or block of wood of the appropriate size to install the seal and, if the seal housing is shouldered, drive the seal down to the shoulder. If the seal housing is unshouldered, the seal should be fitted with its face flush with the housing top face.

Screw threads and fastenings

Always ensure that a blind tapped hole is completely free from oil, grease, water or other fluid before installing the bolt or stud. Failure to do this could cause the housing to crack due to the hydraulic action of the bolt or stud as it is screwed in.

When tightening a castellated nut to accept a split pin, tighten the nut to the specified torque, where applicable, and then tighten further to the next split pin hole. Never slacken the nut to align a split pin hole unless stated in the repair procedure.

When checking or retightening a nut or bolt to a specified torque setting, slacken the nut or bolt by a quarter of a turn, and then retighten to the specified setting.

Locknuts, locktabs and washers

Any fastening which will rotate against a component or housing in the course of tightening should always have a washer between it and the relevant component or housing.

Spring or split washers should always be renewed when they are used to lock a critical component such as a big-end bearing retaining nut or bolt.

Locktabs which are folded over to retain a nut or bolt should always be renewed.

Self-locking nuts can be reused in non-critical areas, providing resistance can be felt when the locking portion passes over the bolt or stud thread.

Split pins must always be replaced with new ones of the correct size for the hole.

Special tools

Some repair procedures in this manual entail the use of special tools such as a press, two or three-legged pullers, spring compressors etc. Wherever possible, suitable readily available alternatives to the manufacturer's special tools are described, and are shown in use. In some instances, where no alternative is possible, it has been necessary to resort to the use of a manufacturer's tool and this has been done for reasons of safety as well as the efficient completion of the repair operation. Unless you are highly skilled and have a thorough understanding of the procedure described, never attempt to bypass the use of any special tool when the procedure described specifies its use. Not only is there a very great risk of personal injury, but expensive damage could be caused to the components involved.

Tools and working facilities

Introduction

A selection of good tools is a fundamental requirement for anyone contemplating the maintenance and repair of a motor vehicle. For the owner who does not possess any, their purchase will prove a considerable expense, offsetting some of the savings made by doing-it-yourself. However, provided that the tools purchased meet the relevant national safety standards and are of good quality, they will last for many years and prove an extremely worthwhile investment.

To help the average owner to decide which tools are needed to carry out the various tasks detailed in this manual, we have compiled three lists of tools under the following headings: *Maintenance and minor repair, Repair and overhaul,* and *Special.* The newcomer to practical mechanics should start off with the *Maintenance and minor repair* tool kit and confine himself to the simpler jobs around the vehicle. Then, as his confidence and experience grow, he can undertake more difficult tasks, buying extra tools as, and when, they are needed. In this way, a *Maintenance and minor repair* tool kit can be built-up into a *Repair and overhaul* tool kit over a considerable period of time without any major cash outlays. The experienced do-it-yourselfer will have a tool kit good enough for most repair and overhaul procedures and will add tools from the *Special* category when he feels the expense is justified by the amount of use to which these tools will be put.

It is obviously not possible to cover the subject of tools fully here. For those who wish to learn more about tools and their use there is a book entitled *How to Choose and Use Car Tools* available from the publishers of this manual.

Maintenance and minor repair tool kit

The tools given in this list should be considered as a minimum requirement if routine maintenance, servicing and minor repair operations are to be undertaken. We recommend the purchase of combination spanners (ring one end, open-ended the other); although more expensive than open-ended ones, they do give the advantages of both types of spanner.

Combination spanners – 10, 11, 12, 13, 14 & 17 mm
Adjustable spanner – 9 inch
Engine sump/gearbox drain plug keys
Spark plug spanner (with rubber insert)
Spark plug gap adjustment tool
Set of feeler gauges
Brake bleed nipple spanner
Screwdriver – 4 in long x $\frac{1}{4}$ in dia (flat blade)
Screwdriver – 4 in long x $\frac{1}{4}$ in dia (cross blade)
Combination pliers – 6 inch
Hacksaw (junior)
Tyre pump
Tyre pressure gauge
Oil can
Fine emery cloth (1 sheet)
Wire brush (small)
Funnel (medium size)

Repair and overhaul tool kit

These tools are virtually essential for anyone undertaking any major repairs to a motor vehicle, and are additional to those given in the *Maintenance and minor repair* list. Included in this list is a comprehensive set of sockets. Although these are expensive they will be found invaluable as they are so versatile – particularly if various drives are included in the set. We recommend the $\frac{1}{2}$ in square-drive type, as this can be used with most proprietary torque wrenches. If you cannot afford a socket set, even bought piecemeal, then inexpensive tubular box spanners are a useful alternative.

The tools in this list will occasionally need to be supplemented by tools from the *Special* list.

Sockets (or box spanners) to cover range in previous list
Reversible ratchet drive (for use with sockets)
Extension piece, 10 inch (for use with sockets)
Universal joint (for use with sockets)
Torque wrench (for use with sockets)
'Mole' wrench – 8 inch
Ball pein hammer
Soft-faced hammer, plastic or rubber
Screwdriver – 6 in long x $\frac{5}{16}$in dia (flat blade)
Screwdriver – 2 in long x $\frac{5}{16}$in square (flat blade)
Screwdriver – 1$\frac{1}{2}$ in long x $\frac{1}{4}$ in dia (cross blade)
Screwdriver – 3 in long x $\frac{1}{8}$ in dia (electricians)
Pliers – electricians side cutters
Pliers – needle nosed
Pliers – circlip (internal and external)
Cold chisel – $\frac{1}{2}$ inch
Scriber
Scraper
Centre punch
Pin punch
Hacksaw
Steel rule/straight-edge
Allen keys (inc. splined/Torx type if necessary)
Selection of files
Wire brush (large)
Axle-stands
Jack (strong trolley or hydraulic type)

Special tools

The tools in this list are those which are not used regularly, are expensive to buy, or which need to be used in accordance with their manufacturers' instructions. Unless relatively difficult mechanical jobs are undertaken frequently, it will not be economic to buy many of these tools. Where this is the case, you could consider clubbing together with friends (or joining a motorists' club) to make a joint purchase, or borrowing the tools against a deposit from a local garage or tool hire specialist.

The following list contains only those tools and instruments freely available to the public, and not those special tools produced by the vehicle manufacturer specifically for its dealer network. You will find

occasional references to these manufacturers' special tools in the text of this manual. Generally, an alternative method of doing the job without the vehicle manufacturers' special tool is given. However, sometimes, there is no alternative to using them. Where this is the case and the relevant tool cannot be bought or borrowed, you will have to entrust the work to a franchised garage.

Valve spring compressor
Piston ring compressor
Balljoint separator
Universal hub/bearing puller
Impact screwdriver
Micrometer and/or vernier gauge
Dial gauge
Stroboscopic timing light
Dwell angle meter/tachometer
Universal electrical multi-meter
Cylinder compression gauge
Lifting tackle
Trolley jack
Light with extension lead
Splined sockets (see Chapter 1)
Torx sockets (see Chapter 1)

Buying tools

For practically all tools, a tool factor is the best source since he will have a very comprehensive range compared with the average garage or accessory shop. Having said that, accessory shops often offer excellent quality tools at discount prices, so it pays to shop around.

There are plenty of good tools around at reasonable prices, but always aim to purchase items which meet the relevant national safety standards. If in doubt, ask the proprietor or manager of the shop for advice before making a purchase.

Care and maintenance of tools

Having purchased a reasonable tool kit, it is necessary to keep the tools in a clean serviceable condition. After use, always wipe off any dirt, grease and metal particles using a clean, dry cloth, before putting the tools away. Never leave them lying around after they have been used. A simple tool rack on the garage or workshop wall, for items such as screwdrivers and pliers is a good idea. Store all normal wrenches and sockets in a metal box. Any measuring instruments, gauges, meters, etc, must be carefully stored where they cannot be damaged or become rusty.

Take a little care when tools are used. Hammer heads inevitably become marked and screwdrivers lose the keen edge on their blades from time to time. A little timely attention with emery cloth or a file will soon restore items like this to a good serviceable finish.

Working facilities

Not to be forgotten when discussing tools, is the workshop itself. If anything more than routine maintenance is to be carried out, some form of suitable working area becomes essential.

It is appreciated that many an owner mechanic is forced by circumstances to remove an engine or similar item, without the benefit of a garage or workshop. Having done this, any repairs should always be done under the cover of a roof.

Wherever possible, any dismantling should be done on a clean, flat workbench or table at a suitable working height.

Any workbench needs a vice: one with a jaw opening of 4 in (100 mm) is suitable for most jobs. As mentioned previously, some clean dry storage space is also required for tools, as well as for lubricants, cleaning fluids, touch-up paints and so on, which become necessary.

Another item which may be required, and which has a much more general usage, is an electric drill with a chuck capacity of at least $\frac{5}{16}$in (8 mm). This, together with a good range of twist drills, is virtually essential for fitting accessories such as mirrors and reversing lights.

Last, but not least, always keep a supply of old newspapers and clean, lint-free rags available, and try to keep any working area as clean as possible.

Spanner jaw gap comparison table

Jaw gap (in)	Spanner size
0.250	$\frac{1}{4}$ in AF
0.276	7 mm
0.313	$\frac{5}{16}$in AF
0.315	8 mm
0.344	$\frac{11}{32}$ in AF; $\frac{1}{8}$ in Whitworth
0.354	9 mm
0.375	$\frac{3}{8}$ in AF
0.394	10 mm
0.433	11 mm
0.438	$\frac{7}{16}$in AF
0.445	$\frac{3}{16}$in Whitworth; $\frac{1}{4}$ in BSF
0.472	12 mm
0.500	$\frac{1}{2}$ in AF
0.512	13 mm
0.525	$\frac{1}{4}$ in Whitworth; $\frac{5}{16}$in BSF
0.551	14 mm
0.563	$\frac{9}{16}$in AF
0.591	15 mm
0.600	$\frac{5}{16}$in Whitworth; $\frac{3}{8}$ in BSF
0.625	$\frac{5}{8}$ in AF
0.630	16 mm
0.669	17 mm
0.686	$\frac{11}{16}$ in AF
0.709	18 mm
0.710	$\frac{3}{8}$ in Whitworth; $\frac{7}{16}$in BSF
0.748	19 mm
0.750	$\frac{3}{4}$ in AF
0.813	$\frac{13}{16}$ in AF
0.820	$\frac{7}{16}$in Whitworth; $\frac{1}{2}$ in BSF
0.866	22 mm
0.875	$\frac{7}{8}$ in AF
0.920	$\frac{1}{2}$ in Whitworth; $\frac{9}{16}$in BSF
0.938	$\frac{15}{16}$ in AF
0.945	24 mm
1.000	1 in AF
1.010	$\frac{9}{16}$in Whitworth; $\frac{5}{8}$ in BSF
1.024	26 mm
1.063	$1\frac{1}{16}$in AF; 27 mm
1.100	$\frac{5}{8}$ in Whitworth; $\frac{11}{16}$ in BSF
1.125	$1\frac{1}{8}$ in AF
1.181	30 mm
1.200	$\frac{11}{16}$ in Whitworth; $\frac{3}{4}$ in BSF
1.250	$1\frac{1}{4}$ in AF
1.260	32 mm
1.300	$\frac{3}{4}$ in Whitworth; $\frac{7}{8}$ in BSF
1.313	$1\frac{5}{16}$in AF
1.390	$\frac{13}{16}$ in Whitworth; $\frac{15}{16}$ in BSF
1.417	36 mm
1.438	$1\frac{7}{16}$in AF
1.480	$\frac{7}{8}$ in Whitworth; 1 in BSF
1.500	$1\frac{1}{2}$ in AF
1.575	40 mm; $\frac{15}{16}$ in Whitworth
1.614	41 mm
1.625	$1\frac{5}{8}$ in AF
1.670	1 in Whitworth; $1\frac{1}{8}$ in BSF
1.688	$1\frac{11}{16}$ in AF
1.811	46 mm
1.813	$1\frac{13}{16}$ in AF
1.860	$1\frac{1}{8}$ in Whitworth; $1\frac{1}{4}$ in BSF
1.875	$1\frac{7}{8}$ in AF
1.969	50 mm
2.000	2 in AF
2.050	$1\frac{1}{4}$ in Whitworth; $1\frac{3}{8}$ in BSF
2.165	55 mm
2.362	60 mm

Safety first!

Professional motor mechanics are trained in safe working procedures. However enthusiastic you may be about getting on with the job in hand, do take the time to ensure that your safety is not put at risk. A moment's lack of attention can result in an accident, as can failure to observe certain elementary precautions.

There will always be new ways of having accidents, and the following points do not pretend to be a comprehensive list of all dangers; they are intended rather to make you aware of the risks and to encourage a safety-conscious approach to all work you carry out on your vehicle.

Essential DOs and DON'Ts

DON'T rely on a single jack when working underneath the vehicle. Always use reliable additional means of support, such as axle stands, securely placed under a part of the vehicle that you know will not give way.

DON'T attempt to loosen or tighten high-torque nuts (e.g. wheel hub nuts) while the vehicle is on a jack; it may be pulled off.

DON'T start the engine without first ascertaining that the transmission is in neutral (or 'Park' where applicable) and the parking brake applied.

DON'T suddenly remove the filler cap from a hot cooling system – cover it with a cloth and release the pressure gradually first, or you may get scalded by escaping coolant.

DON'T attempt to drain oil until you are sure it has cooled sufficiently to avoid scalding you.

DON'T grasp any part of the engine, exhaust or catalytic converter without first ascertaining that it is sufficiently cool to avoid burning you.

DON'T allow brake fluid or antifreeze to contact vehicle paintwork.

DON'T syphon toxic liquids such as fuel, brake fluid or antifreeze by mouth, or allow them to remain on your skin.

DON'T inhale dust – it may be injurious to health (see *Asbestos* below).

DON'T allow any spilt oil or grease to remain on the floor – wipe it up straight away, before someone slips on it.

DON'T use ill-fitting spanners or other tools which may slip and cause injury.

DON'T attempt to lift a heavy component which may be beyond your capability – get assistance.

DON'T rush to finish a job, or take unverified short cuts.

DON'T allow children or animals in or around an unattended vehicle.

DO wear eye protection when using power tools such as drill, sander, bench grinder etc, and when working under the vehicle.

DO use a barrier cream on your hands prior to undertaking dirty jobs – it will protect your skin from infection as well as making the dirt easier to remove afterwards; but make sure your hands aren't left slippery. Note that long-term contact with used engine oil can be a health hazard.

DO keep loose clothing (cuffs, tie etc) and long hair well out of the way of moving mechanical parts.

DO remove rings, wristwatch etc, before working on the vehicle – especially the electrical system.

DO ensure that any lifting tackle used has a safe working load rating adequate for the job.

DO keep your work area tidy – it is only too easy to fall over articles left lying around.

DO get someone to check periodically that all is well, when working alone on the vehicle.

DO carry out work in a logical sequence and check that everything is correctly assembled and tightened afterwards.

DO remember that your vehicle's safety affects that of yourself and others. If in doubt on any point, get specialist advice.

IF, in spite of following these precautions, you are unfortunate enough to injure yourself, seek medical attention as soon as possible.

Asbestos

Certain friction, insulating, sealing, and other products – such as brake linings, brake bands, clutch linings, torque converters, gaskets, etc – contain asbestos. *Extreme care must be taken to avoid inhalation of dust from such products since it is hazardous to health.* If in doubt, assume that they *do* contain asbestos.

Fire

Remember at all times that petrol (gasoline) is highly flammable. Never smoke, or have any kind of naked flame around, when working on the vehicle. But the risk does not end there – a spark caused by an electrical short-circuit, by two metal surfaces contacting each other, by careless use of tools, or even by static electricity built up in your body under certain conditions, can ignite petrol vapour, which in a confined space is highly explosive.

Always disconnect the battery earth (ground) terminal before working on any part of the fuel or electrical system, and never risk spilling fuel on to a hot engine or exhaust.

It is recommended that a fire extinguisher of a type suitable for fuel and electrical fires is kept handy in the garage or workplace at all times. Never try to extinguish a fuel or electrical fire with water.

Note: *Any reference to a 'torch' appearing in this manual should always be taken to mean a hand-held battery-operated electric lamp or flashlight. It does NOT mean a welding/gas torch or blowlamp.*

Fumes

Certain fumes are highly toxic and can quickly cause unconsciousness and even death if inhaled to any extent. Petrol (gasoline) vapour comes into this category, as do the vapours from certain solvents such as trichloroethylene. Any draining or pouring of such volatile fluids should be done in a well ventilated area.

When using cleaning fluids and solvents, read the instructions carefully. Never use materials from unmarked containers – they may give off poisonous vapours.

Never run the engine of a motor vehicle in an enclosed space such as a garage. Exhaust fumes contain carbon monoxide which is extremely poisonous; if you need to run the engine, always do so in the open air or at least have the rear of the vehicle outside the workplace.

If you are fortunate enough to have the use of an inspection pit, never drain or pour petrol, and never run the engine, while the vehicle is standing over it; the fumes, being heavier than air, will concentrate in the pit with possibly lethal results.

The battery

Never cause a spark, or allow a naked light, near the vehicle's battery. It will normally be giving off a certain amount of hydrogen gas, which is highly explosive.

Always disconnect the battery earth (ground) terminal before working on the fuel or electrical systems.

If possible, loosen the filler plugs or cover when charging the battery from an external source. Do not charge at an excessive rate or the battery may burst.

Take care when topping up and when carrying the battery. The acid electrolyte, even when diluted, is very corrosive and should not be allowed to contact the eyes or skin.

If you ever need to prepare electrolyte yourself, always add the acid slowly to the water, and never the other way round. Protect against splashes by wearing rubber gloves and goggles.

When jump starting a car using a booster battery, for negative earth (ground) vehicles, connect the jump leads in the following sequence: First connect one jump lead between the positive (+) terminals of the two batteries. Then connect the other jump lead first to the negative (–) terminal of the booster battery, and then to a good earthing (ground) point on the vehicle to be started, at least 18 in (45 cm) from the battery if possible. Ensure that hands and jump leads are clear of any moving parts, and that the two vehicles do not touch. Disconnect the leads in the reverse order.

Mains electricity and electrical equipment

When using an electric power tool, inspection light etc, always ensure that the appliance is correctly connected to its plug and that, where necessary, it is properly earthed (grounded). Do not use such appliances in damp conditions and, again, beware of creating a spark or applying excessive heat in the vicinity of fuel or fuel vapour. Also ensure that the appliances meet the relevant national safety standards.

Ignition HT voltage

A severe electric shock can result from touching certain parts of the ignition system, such as the HT leads, when the engine is running or being cranked, particularly if components are damp or the insulation is defective. Where an electronic ignition system is fitted, the HT voltage is much higher and could prove fatal.

Routine maintenance

Routine maintenance is essential to keep your vehicle in a safe reliable condition, giving performance, economy and long component life.

The need for periodic lubrication (oiling, greasing etc) of many components has been drastically reduced or eliminated altogether in modern vehicles. However the need for visual inspection at frequent intervals still exists, and may lead to system replenishment or component renewal.

The routine maintenance schedule which follows is dependent upon the specific lubricants being used, and the vehicle being operated under normal conditions.

Under abnormal conditions, the maintenance schedule may need to be intensified. Short, stop-start journeys, sustained high-speed driving, driving in hot or dusty conditions (temperatures frequently above 30°C (86°F), or cold climates (temperatures frequently below –15°C (5°F). Vehicle use in rough or dusty terrain will also affect inspection intervals.

Where vehicles are being operated under such 'abnormal' conditions the advice of a Peugeot dealer should be sought.

Weekly, or before a long journey

Engine

Check the engine oil level and top up as necessary (Chapter 1)

Braking system

Check the brake fluid level and top up as necessary (Chapter 8)

General

Check the power-assisted steering fluid level and top up as necessary (Chapter 10)
Inspect the tyres for wear, cuts, bulges and damage. Inflate to the correct pressures (Chapter 9)
Check the level of fluid in the windscreen washer reservoirs and top up as necessary (Chapter 12)
Check the condition of the windscreen wiper blades (Chapter 12)
Check the security and cleanliness of the battery terminals, and check the operation of all electrical services – lights, horn, wipers etc (Chapter 12)
Check the tension and condition of the alternator and power steering drivebelts (Chapters 12 and 10)

Every 6000 miles (9000 km) or 6 months, whichever comes sooner

In addition to weekly maintenance

Engine (Chapter 1)

Drain and renew the engine oil
Renew the engine oil filter

Cooling system (Chapter 2)

Check and top up the coolant level

Automatic transmission (Chapter 6)

Check the fluid level and top up as necessary

Braking system (Chapter 8)

Check and top up the level of fluid in the reservoir
Inspect all brake hoses and pipelines for leaks

Every 12 000 miles (18 000 km) or 12 months, whichever comes sooner

In addition to those operations in the 6000 mile service

Engine (Chapter 1)

Check condition and security of engine breather hoses

Fuel and exhaust system (Chapter 3)

Renew the fuel filter
Check the condition of, and adjust as necessary, the accelerator cable
Check and adjust idle speed and mixture (CO) content. Clean the fuel filter in the carburettor (where applicable)

Ignition system (Chapter 4)

Renew the spark plugs

Clutch (Chapter 5)

Check and adjust the clutch pedal travel

Driveshafts (Chapter 7)

Check the driveshaft rubber boots for damage and security

Braking system (Chapter 8)

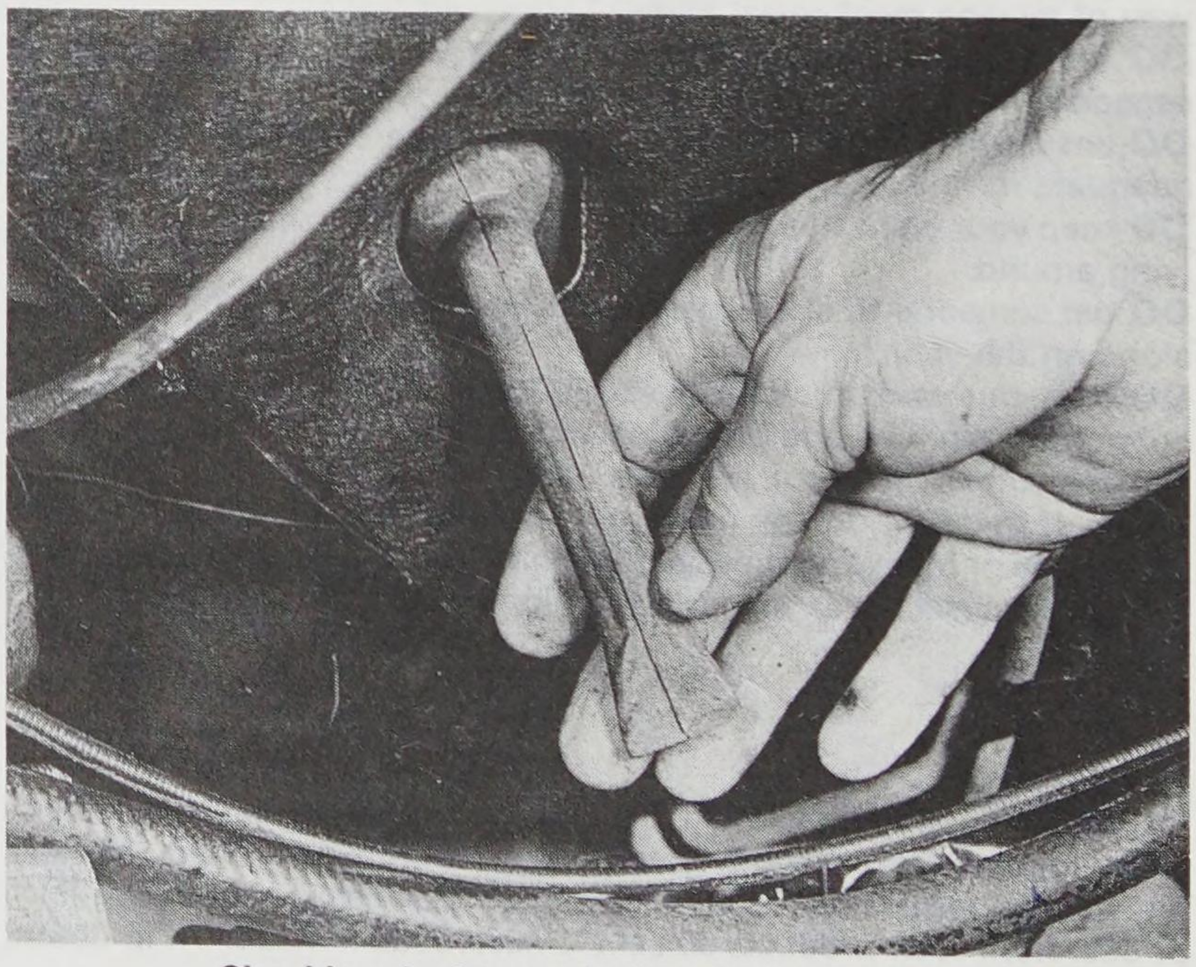
Check front and rear disc brake pads for wear
Check the operation of the handbrake and adjust as necessary

Steering system (Chapter 10)

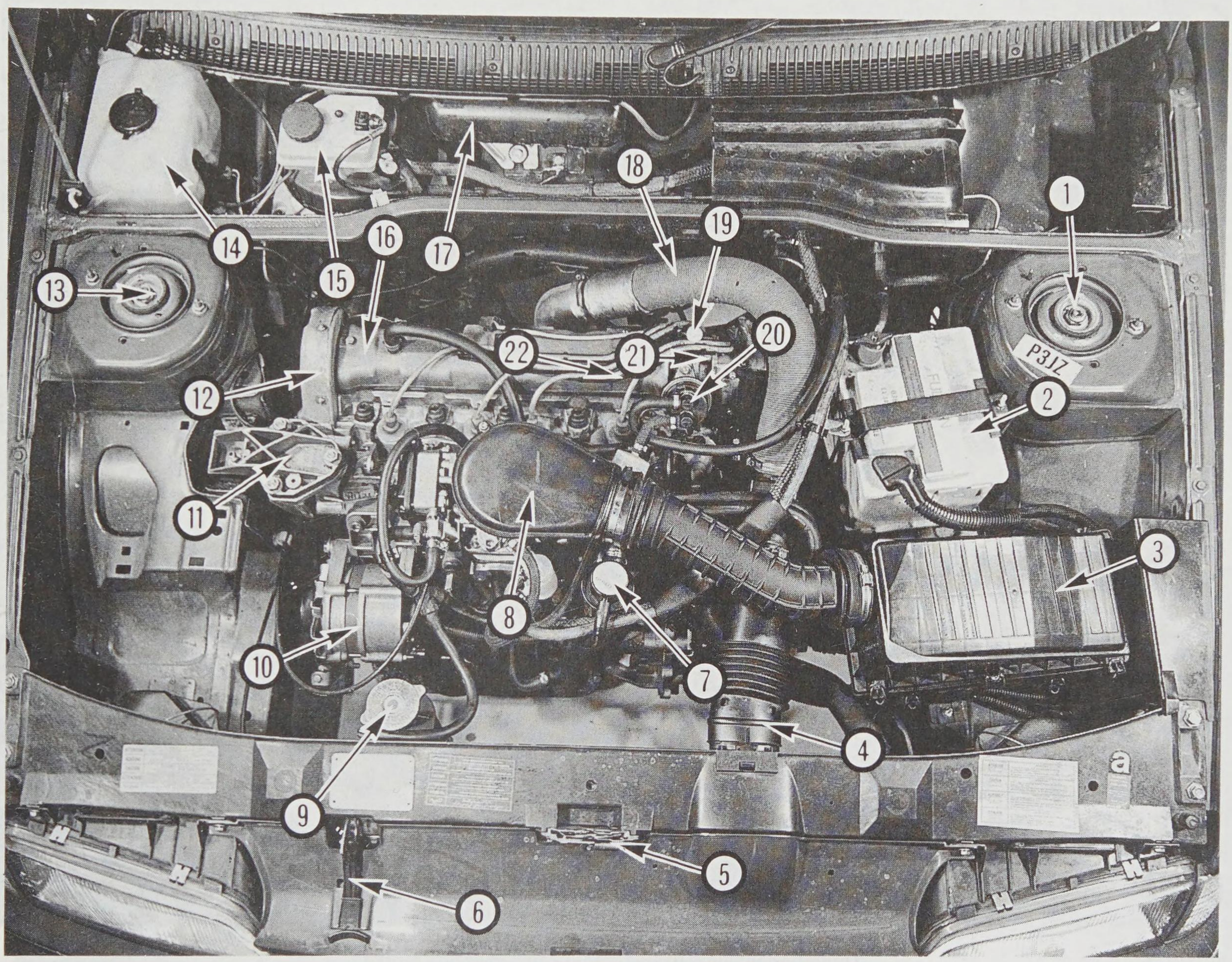
Check the steering rack, steering arm balljoints and lower balljoint bellows for damage and security

Bodywork (Chapter 11)

Check and unblock all door and sill drain channels. Also check the heater drain tube (photo)

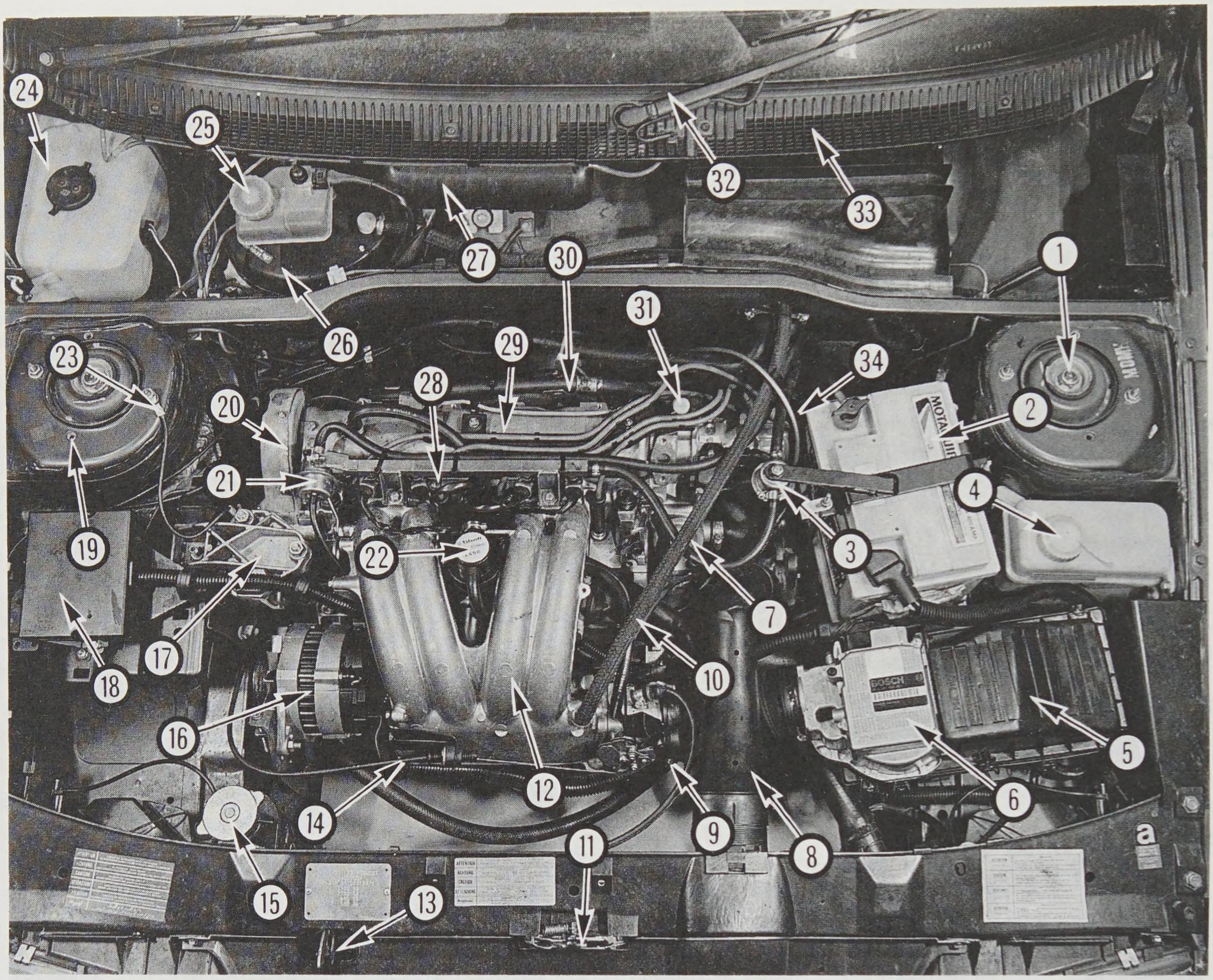


Checking the heater drain tube for blockage



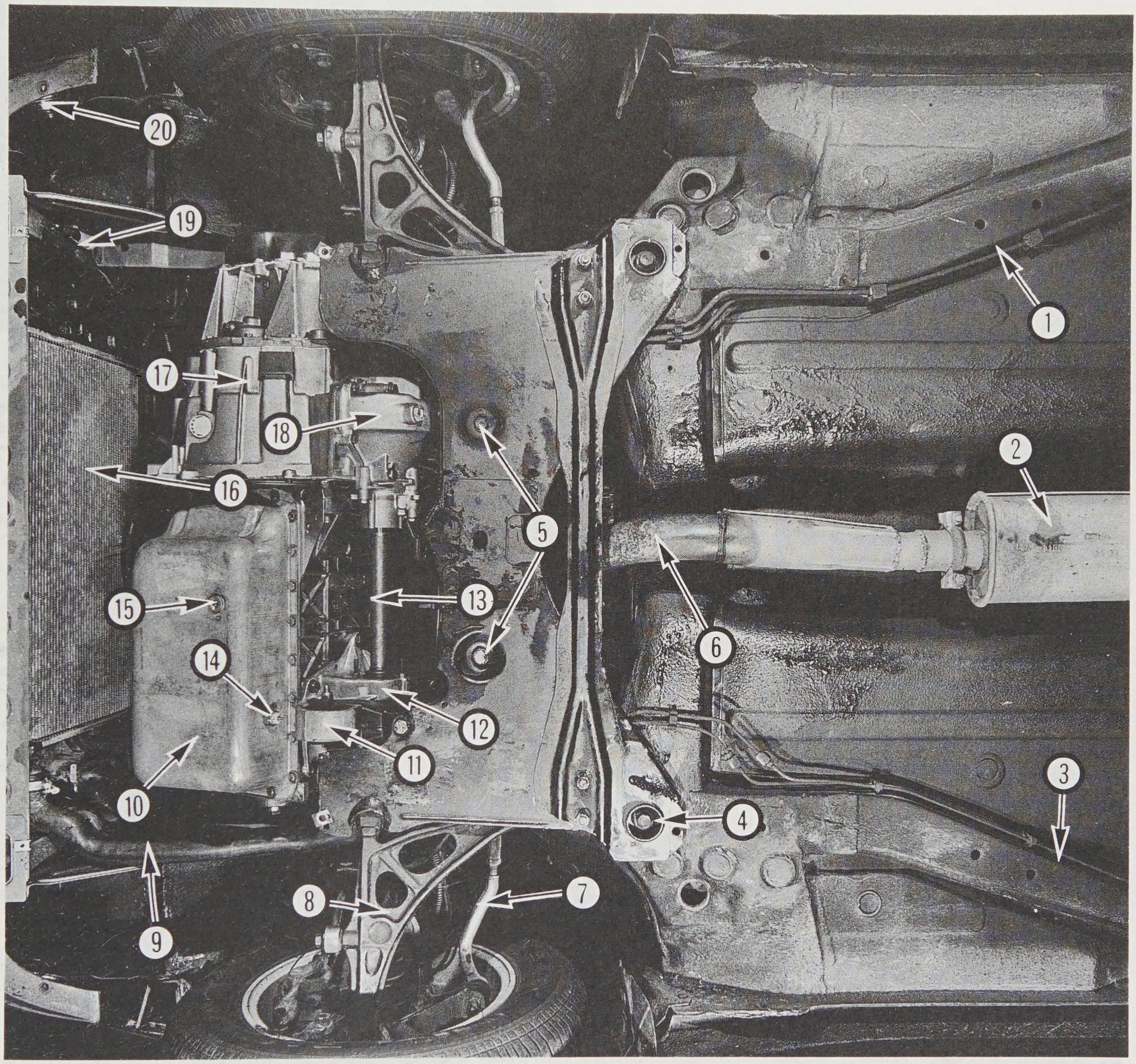
Underbonnet view of 1580 cc GL model

1 *Left-hand suspension strut top mounting*
2 *Battery*
3 *Air filter housing*
4 *Cold air intake duct*
5 *Bonnet lock*
6 *Bonnet release latch*
7 *Engine oil filler cap/tube*
8 *Carburettor air intake duct (carburettor below)*
9 *Radiator (coolant filler) cap*
10 *Alternator*
11 *Right-hand engine mounting*
12 *Camshaft drivebelt upper cover*
13 *Right-hand suspension strut top mounting*
14 *Windscreen wash reservoir*
15 *Brake hydraulic fluid reservoir*
16 *Camshaft cover*
17 *Windscreen wiper motor (beneath cover)*
18 *Hot air intake duct*
19 *Engine oil level dipstick*
20 *Fuel pump*
21 *Distributor*
22 *Spark plug HT leads*



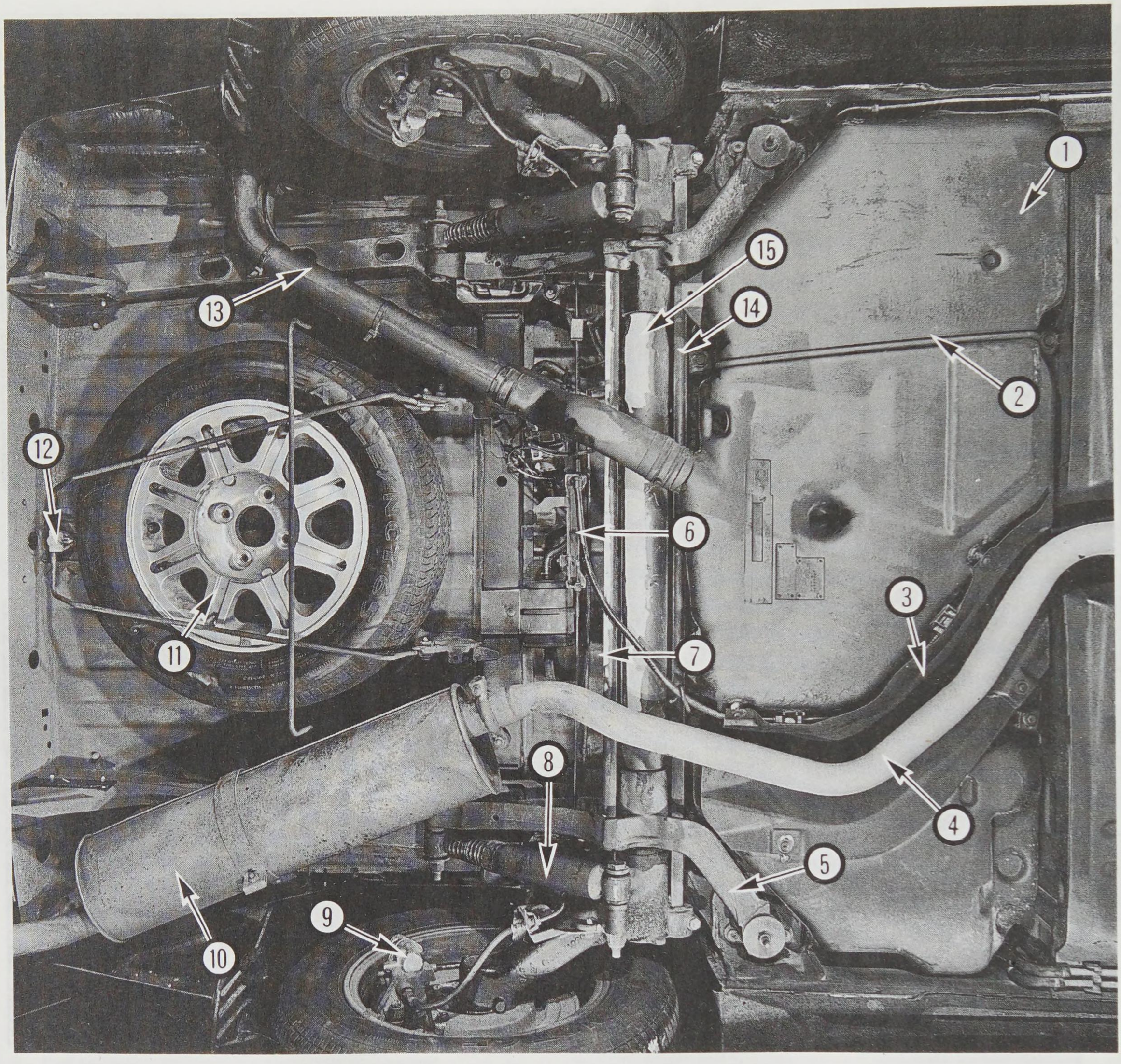
Underbonnet view of 1905 cc GTX fuel injection model

1 *Left-hand suspension strut top mounting*
2 *Battery*
3 *Fuel damper*
4 *Power steering fluid reservoir*
5 *Air filter cover*
6 *Fuel injection system control unit*
7 *Thermostat housing*
8 *Cold air intake*
9 *Throttle housing*
10 *Brake servo vacuum hose*
11 *Bonnet lock*
12 *Inlet manifold*
13 *Bonnet release latch*
14 *Accelerator cable*
15 *Radiator (coolant filler cap)*
16 *Alternator*
17 *Right-hand engine mounting*
18 *Fuel injection relay box*
19 *Right-hand suspension strut top mounting*
20 *Camshaft drivebelt top cover*
21 *Fuel pressure regulator*
22 *Engine oil filler tube*
23 *Earth lead*
24 *Windscreen wash fluid reservoir*
25 *Brake system hydraulic fluid reservoir*
26 *Brake servo vacuum unit*
27 *Windscreen wiper motor (below cover)*
28 *Fuel rail and injectors*
29 *Camshaft cover*
30 *Power steering hose*
31 *Engine oil level dipstick*
32 *Windscreen wiper arm*
33 *Air intake grille (heating and ventilation*
34 *Distributor*



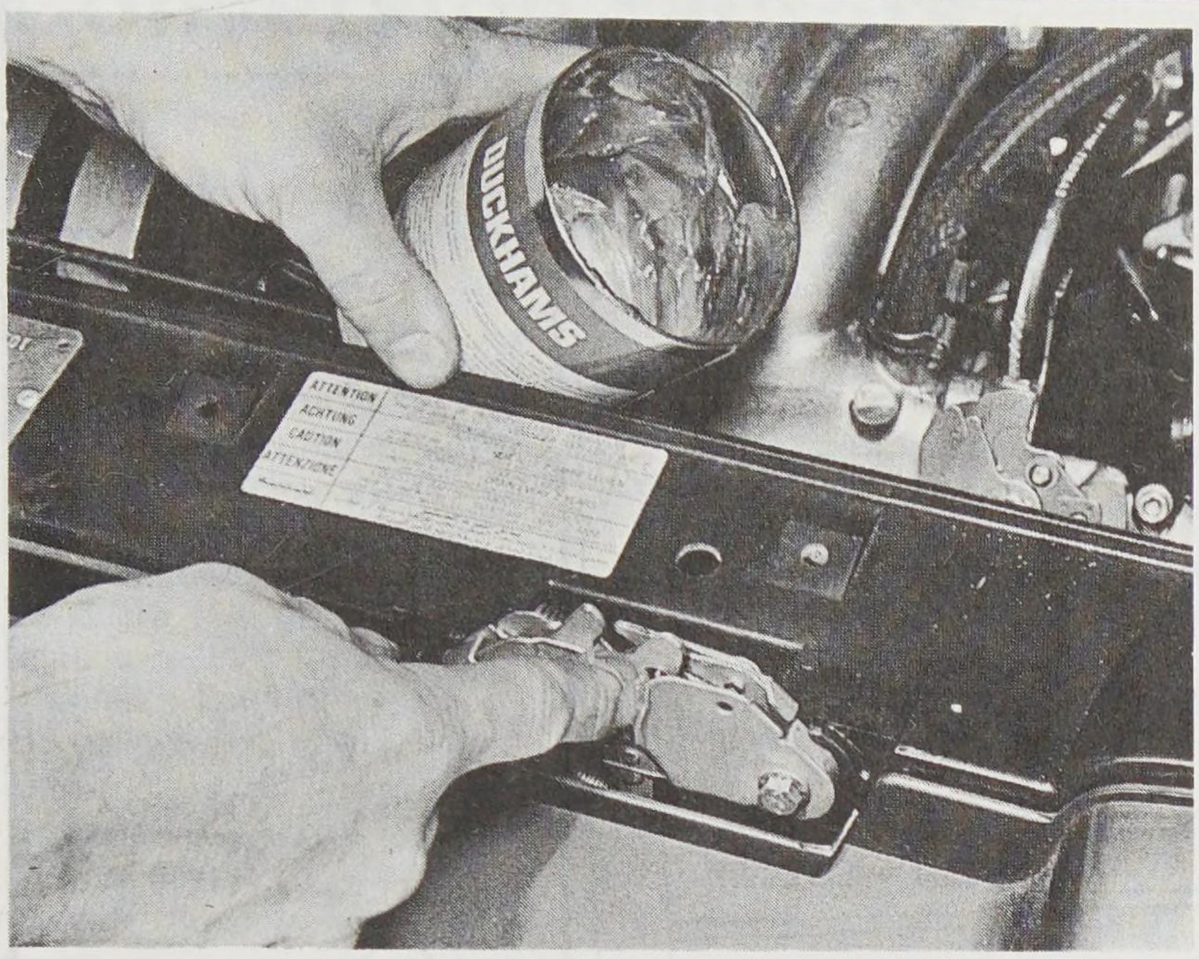
Front underbody view of 1905 cc GTX fuel injection model

1 *Fuel lines*
2 *Front exhaust silencer*
3 *Brake lines*
4 *Front subframe rear mounting*
5 *Steering rack mountings*
6 *Exhaust downpipe*
7 *Steering track rod*
8 *Lower suspension arm*
9 *Radiator lower hose*
10 *Engine oil sump*
11 *Rear engine mounting*
12 *Driveshaft intermediate bearing housing*
13 *Right-hand driveshaft*
14 *Oil temperature sensor*
15 *Engine oil drain plug*
16 *Radiator*
17 *Transmission housing*
18 *Differential housing*
19 *Cooling fan resistor*
20 *Horn*



Rear underbody view of 1905 cc GTX fuel injection model

1 *Fuel tank*
2 *Fuel tank supporting strap*
3 *Heat shield*
4 *Exhaust pipe*
5 *Rear suspension side member*
6 *Handbrake cable equaliser mechanism*
7 *Rear suspension torsion bar*
8 *Rear shock absorber*
9 *Rear disc brake calliper*
10 *Exhaust rear silencer*
11 *Spare wheel (cover removed)*
12 *Spare wheel carrier support hook*
13 *Fuel filler hose*
14 *Rear anti-roll bar*
15 *Suspension cross-tube*



Greasing the bonnet lock

Every 18 000 miles (28 000 km) or 18 months, whichever comes sooner

In addition to those operations in the 6000 mile service

Bodywork (Chapter 11)

Lubricate all door locks, hinges, bonnet release cable, tailgate and boot hinges etc (photo)

Every 24 000 miles (38 000 km) or 24 months, whichever comes sooner

In addition to those operations in the 12 000 mile service

Cooling system (Chapter 2)

Renew the coolant

Fuel system (Chapter 3)

Renew the air filter element

Ignition system (Chapter 4)

Check ignition timing

Gearbox (Chapter 6)

Renew the fluid in the automatic transmission unit

Brake system (Chapter 8)

Renew the hydraulic fluid in the braking system

Suspension (Chapter 9)

Inspect all hubs and balljoints for play, security and damage. Inspect all rubber suspension bushes for damage, swelling and deterioration. Check suspension dampers for leaks

Every 36 000 miles (58 000 km) or 36 months, whichever comes sooner

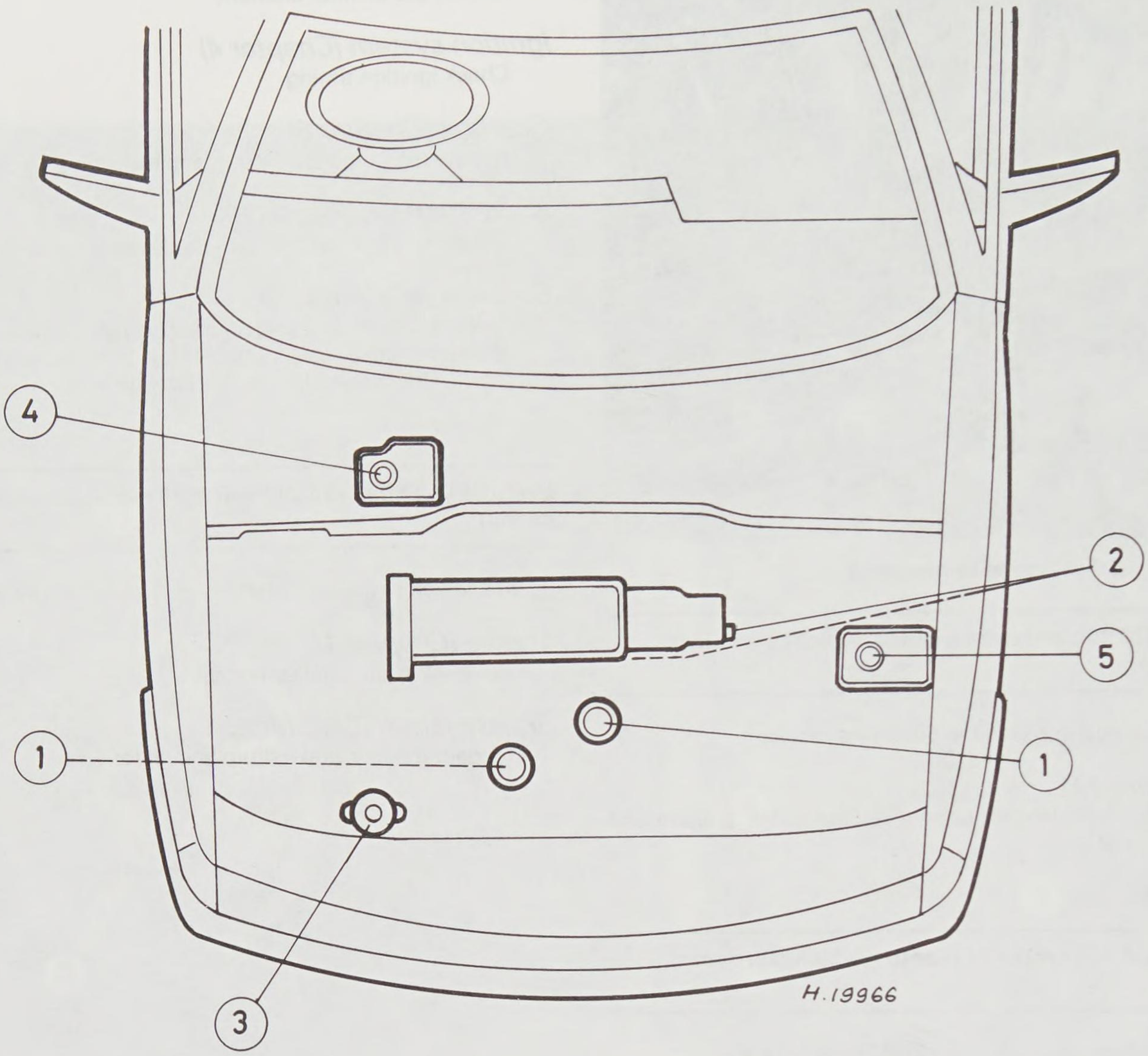
In addition to those operations in the 12 000 mile service

Engine (Chapter 1)

Renew the camshaft drivebelt

Brake system (Chapter 8)

Inspect the rear brake drum linings for wear



Recommended lubricants and fluids

Component or system	Lubricant type/specification	Duckhams recommendation
Engine (1)	Multigrade engine oil, viscosity SAE 10W/40, to API SF or better	Duckhams QXR, Hypergrade, or 10W/40 Motor Oil
Manual gearbox (2)	Gear oil, viscosity 75W/80W, to API GL5	Duckhams Hypoid PT 75W/80
Automatic transmission (2)	Dexron II ATF	Duckhams D-Matic
Cooling system (3)	Ethlene-glycol based antifreeze (Napgel 2000/1)	Duckhams Universal Antifreeze and Summer Coolant
Braking system (4)	Hydraulic fluid to SAE J1703 or DOT 4	Duckhams Universal Brake and Clutch Fluid
Power steering system (5)	Dexron II ATF	Duckhams D-Matic

Conversion factors

Length (distance)							
Inches (in)	X	25.4	= Millimetres (mm)	X	0.0394	=	Inches (in)
Feet (ft)	X	0.305	= Metres (m)	X	3.281	=	Feet (ft)
Miles	X	1.609	= Kilometres (km)	X	0.621	=	Miles
Volume (capacity)							
Cubic inches (cu in; in^3)	X	16.387	= Cubic centimetres (cc; cm^3)	X	0.061	=	Cubic inches (cu in; in^3)
Imperial pints (Imp pt)	X	0.568	= Litres (l)	X	1.76	=	Imperial pints (Imp pt)
Imperial quarts (Imp qt)	X	1.137	= Litres (l)	X	0.88	=	Imperial quarts (Imp qt)
Imperial quarts (Imp qt)	X	1.201	= US quarts (US qt)	X	0.833	=	Imperial quarts (Imp qt)
US quarts (US qt)	X	0.946	= Litres (l)	X	1.057	=	US quarts (US qt)
Imperial gallons (Imp gal)	X	4.546	= Litres (l)	X	0.22	=	Imperial gallons (Imp gal)
Imperial gallons (Imp gal)	X	1.201	= US gallons (US gal)	X	0.833	=	Imperial gallons (Imp gal)
US gallons (US gal)	X	3.785	= Litres (l)	X	0.264	=	US gallons (US gal)
Mass (weight)							
Ounces (oz)	X	28.35	= Grams (g)	X	0.035	=	Ounces (oz)
Pounds (lb)	X	0.454	= Kilograms (kg)	X	2.205	=	Pounds (lb)
Force							
Ounces-force (ozf; oz)	X	0.278	= Newtons (N)	X	3.6	=	Ounces-force (ozf; oz)
Pounds-force (lbf; lb)	X	4.448	= Newtons (N)	X	0.225	=	Pounds-force (lbf; lb)
Newtons (N)	X	0.1	= Kilograms-force (kgf; kg)	X	9.81	=	Newtons (N)
Pressure							
Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	X	0.070	= Kilograms-force per square centimetre (kgf/cm^2; kg/cm^2)	X	14.223	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)
Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	X	0.068	= Atmospheres (atm)	X	14.696	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)
Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	X	0.069	= Bars	X	14.5	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)
Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	X	6.895	= Kilopascals (kPa)	X	0.145	=	Pounds-force per square inch (psi; lbf/in^2; lb/in^2)
Kilopascals (kPa)	X	0.01	= Kilograms-force per square centimetre (kgf/cm^2; kg/cm^2)	X	98.1	=	Kilopascals (kPa)
Millibar (mbar)	X	100	= Pascals (Pa)	X	0.01	=	Millibar (mbar)
Millibar (mbar)	X	0.0145	= Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	X	68.947	=	Millibar (mbar)
Millibar (mbar)	X	0.75	= Millimetres of mercury (mmHg)	X	1.333	=	Millibar (mbar)
Millibar (mbar)	X	0.401	= Inches of water (inH_2O)	X	2.491	=	Millibar (mbar)
Millimetres of mercury (mmHg)	X	0.535	= Inches of water (inH_2O)	X	1.868	=	Millimetres of mercury (mmHg)
Inches of water (inH_2O)	X	0.036	= Pounds-force per square inch (psi; lbf/in^2; lb/in^2)	X	27.68	=	Inches of water (inH_2O)
Torque (moment of force)							
Pounds-force inches (lbf in; lb in)	X	1.152	= Kilograms-force centimetre (kgf cm; kg cm)	X	0.868	=	Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	X	0.113	= Newton metres (Nm)	X	8.85	=	Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	X	0.083	= Pounds-force feet (lbf ft; lb ft)	X	12	=	Pounds-force inches (lbf in; lb in)
Pounds-force feet (lbf ft; lb ft)	X	0.138	= Kilograms-force metres (kgf m; kg m)	X	7.233	=	Pounds-force feet (lbf ft; lb ft)
Pounds-force feet (lbf ft; lb ft)	X	1.356	= Newton metres (Nm)	X	0.738	=	Pounds-force feet (lbf ft; lb ft)
Newton metres (Nm)	X	0.102	= Kilograms-force metres (kgf m; kg m)	X	9.804	=	Newton metres (Nm)
Power							
Horsepower (hp)	X	745.7	= Watts (W)	X	0.0013	=	Horsepower (hp)
Velocity (speed)							
Miles per hour (miles/hr; mph)	X	1.609	= Kilometres per hour (km/hr; kph)	X	0.621	=	Miles per hour (miles/hr; mph)
*Fuel consumption**							
Miles per gallon, Imperial (mpg)	X	0.354	= Kilometres per litre (km/l)	X	2.825	=	Miles per gallon, Imperial (mpg)
Miles per gallon, US (mpg)	X	0.425	= Kilometres per litre (km/l)	X	2.352	=	Miles per gallon, US (mpg)

Temperature

Degrees Fahrenheit = (°C x 1.8) + 32

Degrees Celsius (Degrees Centigrade; °C) = (°F - 32) x 0.56

**It is common practice to convert from miles per gallon (mpg) to litres/100 kilometres (l/100km), where mpg (Imperial) x l/100 km = 282 and mpg (US) x l/100 km = 235*

Fault diagnosis

Introduction

The vehicle owner who does his or her own maintenance according to the recommended schedules should not have to use this section of the manual very often. Modern component reliability is such that, provided those items subject to wear or deterioration are inspected or renewed at the specified intervals, sudden failure is comparatively rare. Faults do not usually just happen as a result of sudden failure, but develop over a period of time. Major mechanical failures in particular are usually preceded by characteristic symptoms over hundreds or even thousands of miles. Those components which do occasionally fail without warning are often small and easily carried in the vehicle.

With any fault finding, the first step is to decide where to begin investigations. Sometimes this is obvious, but on other occasions a little detective work will be necessary. The owner who makes half a dozen haphazard adjustments or replacements may be successful in curing a fault (or its symptoms), but he will be none the wiser if the fault recurs and he may well have spent more time and money than was necessary. A calm and logical approach will be found to be more satisfactory in the long run. Always take into account any warning signs or abnormalities that may have been noticed in the period preceding the fault – power loss, high or low gauge readings, unusual noises or smells, etc – and remember that failure of components such as fuses or spark plugs may only be pointers to some underlying fault.

The pages which follow here are intended to help in cases of failure to start or breakdown on the road. There is also a Fault Diagnosis Section at the end of each Chapter which should be consulted if the preliminary checks prove unfruitful. Whatever the fault, certain basic principles apply. These are as follows:

Verify the fault. This is simply a matter of being sure that you know what the symptoms are before starting work. This is particularly important if you are investigating a fault for someone else who may not have described it very accurately.

Don't overlook the obvious. For example, if the vehicle won't start, is there petrol in the tank? (Don't take anyone else's word on this particular point, and don't trust the fuel gauge either!) If an electrical fault is indicated, look for loose or broken wires before digging out the test gear.

Cure the disease, not the symptom. Substituting a flat battery with a fully charged one will get you off the hard shoulder, but if the underlying cause is not attended to, the new battery will go the same way. Similarly, changing oil-fouled spark plugs for a new set will get you moving again, but remember that the reason for the fouling (if it wasn't simply an incorrect grade of plug) will have to be established and corrected.

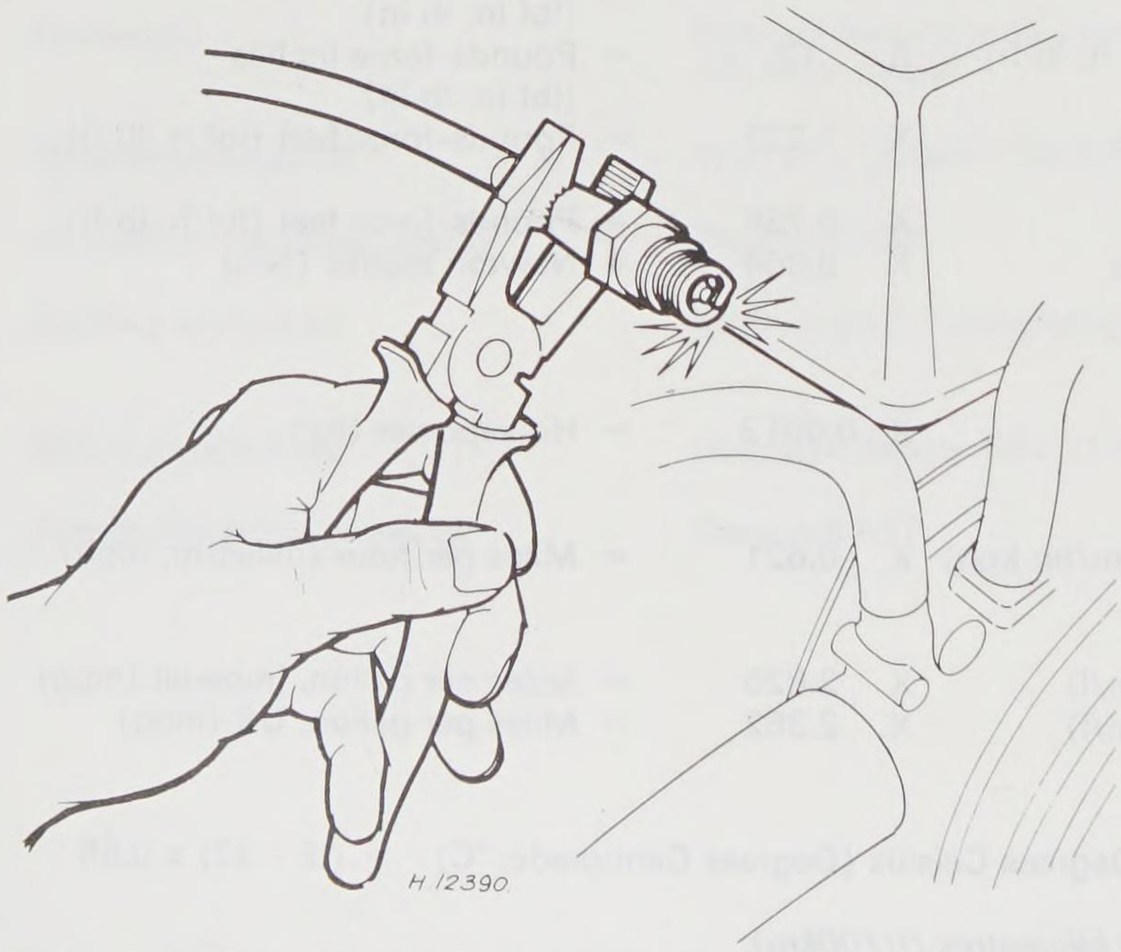
Don't take anything for granted. Particularly, don't forget that a 'new' component may itself be defective (especially if it's been rattling round in the boot for months), and don't leave components out of a fault diagnosis sequence just because they are new or recently fitted. When you do finally diagnose a difficult fault, you'll probably realise that all the evidence was there from the start.

Electrical faults

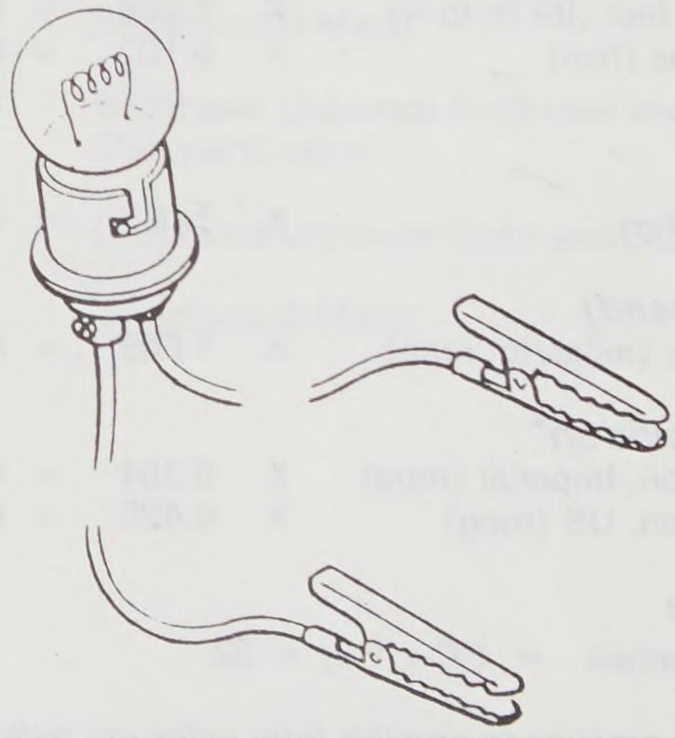
Electrical faults can be more puzzling than straightforward mechanical failures, but they are no less susceptible to logical analysis if the basic principles of operation are understood. Vehicle electrical wiring exists in extremely unfavourable conditions – heat, vibration and chemical attack – and the first things to look for are loose or corroded connections and broken or chafed wires, especially where the wires pass through holes in the bodywork or are subject to vibration.

All metal-bodied vehicles in current production have one pole of the battery 'earthed', ie connected to the vehicle bodywork, and in nearly all modern vehicles it is the negative (–) terminal. The various electrical components – motors, bulb holders etc – are also connected to earth, either by means of a lead or directly by their mountings. Electric current flows through the component and then back to the battery via the bodywork. If the component mounting is loose or corroded, or if a good path back to the battery is not available, the circuit will be incomplete and malfunction will result. The engine and/or gearbox are also earthed by means of flexible metal straps to the body or subframe; if these straps are loose or missing, starter motor, generator and ignition trouble may result.

Assuming the earth return to be satisfactory, electrical faults will be due either to component malfunction or to defects in the current supply. Individual components are dealt with in Chapter 12. If supply wires are broken or cracked internally this results in an open-circuit, and the easiest way to check for this is to bypass the suspect wire temporarily

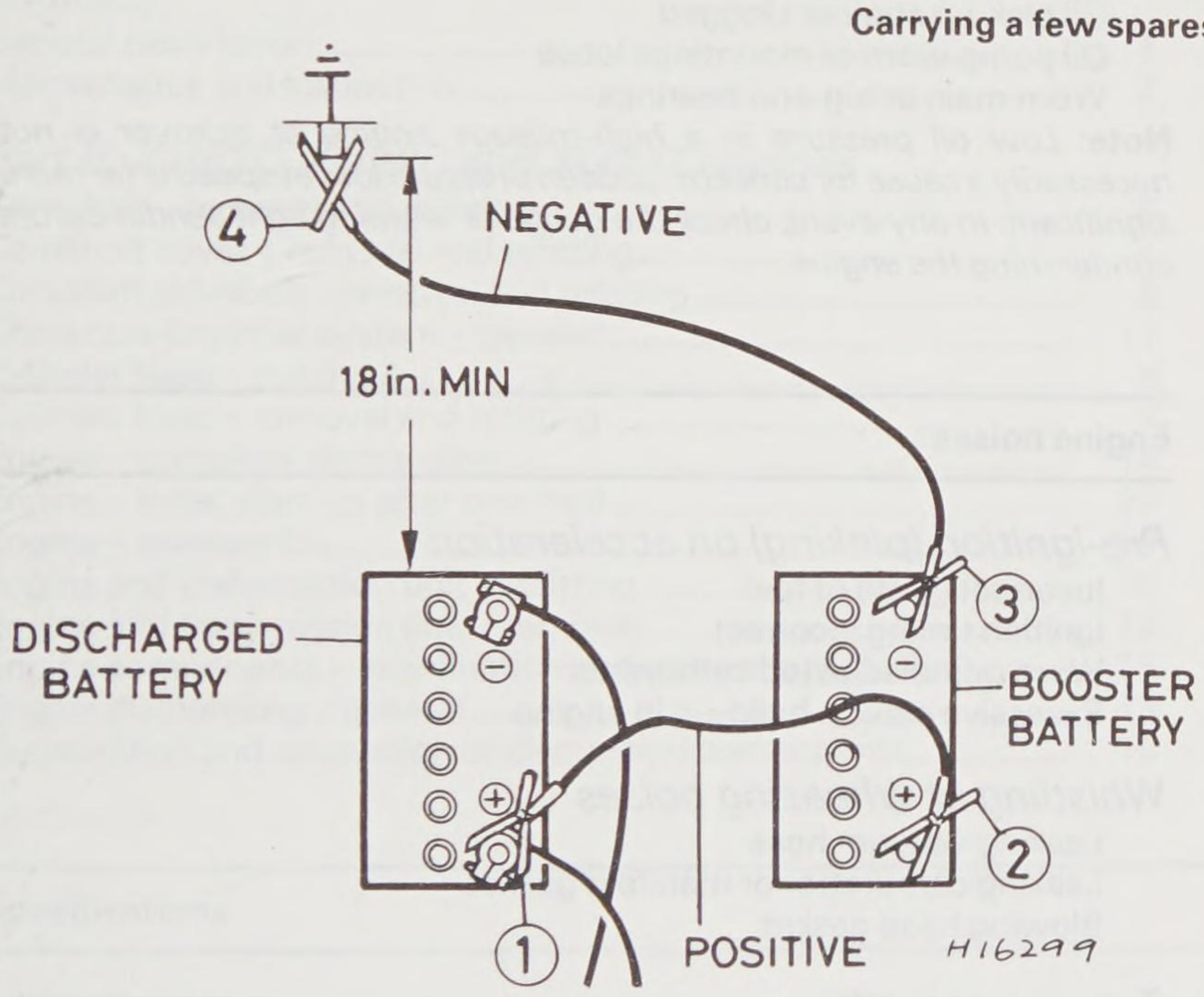


Crank engine and check for spark. Hold lead with an insulated tool



A simple test lamp is useful for checking certain electrical faults

Carrying a few spares can save a long walk!



Jump start lead connections for negative earth vehicles – connect leads in order shown

with a length of wire having a crocodile clip or suitable connector at each end. Alternatively, a 12V test lamp can be used to verify the presence of supply voltage at various points along the wire and the break can be thus isolated.

If a bare portion of a live wire touches the bodywork or other earthed metal part, the electricity will take the low-resistance path thus formed back to the battery: this is known as a short-circuit. Hopefully a short-circuit will blow a fuse, but otherwise it may cause burning of the insulation (and possibly further short-circuits) or even a fire. This is why it is inadvisable to bypass persistently blowing fuses with silver foil or wire.

Spares and tool kit

Most vehicles are supplied only with sufficient tools for wheel changing; the *Maintenance and minor repair* tool kit detailed in *Tools and working facilities,* with the addition of a hammer, is probably sufficient for those repairs that most motorists would consider attempting at the roadside. In addition a few items which can be fitted without too much trouble in the event of a breakdown should be carried. Experience and available space will modify the list below, but the following may save having to call on professional assistance:

Spark plugs, clean and correctly gapped
HT lead and plug cap – long enough to reach the plug furthest from the distributor
Distributor rotor
Drivebelt(s) – emergency type may suffice
Spare fuses
Set of principal light bulbs
Tin of radiator sealer and hose bandage
Exhaust bandage
Roll of insulating tape
Length of soft iron wire
Length of electrical flex
Torch or inspection lamp (can double as test lamp)
Battery jump leads
Tow-rope
Ignition water dispersant aerosol
Litre of engine oil
Sealed can of hydraulic fluid
Emergency windscreen
Worm drive clips

If spare fuel is carried, a can designed for the purpose should be used to minimise risks of leakage and collision damage. A first aid kit and a warning triangle, whilst not at present compulsory in the UK, are obviously sensible items to carry in addition to the above.

When touring abroad it may be advisable to carry additional spares which, even if you cannot fit them yourself, could save having to wait while parts are obtained. The items below may be worth considering:

Clutch and throttle cables
Cylinder head gasket
Alternator brushes

One of the motoring organisations will be able to advise on availability of fuel etc in foreign countries.

Engine will not start

Engine fails to turn when starter operated

Flat battery (recharge, use jump leads, or push start)
Battery terminals loose or corroded
Battery earth to body defective
Engine earth strap loose or broken
Starter motor (or solenoid) wiring loose or broken
Automatic transmission selector in wrong position, or inhibitor switch faulty
Ignition/starter switch faulty
Major mechanical failure (seizure)
Starter or solenoid internal fault (see Chapter 12)

Starter motor turns engine slowly
Partially discharged battery (recharge, use jump leads, or push start)
Battery terminals loose or corroded
Battery earth to body defective
Engine earth strap loose
Starter motor (or solenoid) wiring loose
Starter motor internal fault (see Chapter 12)

Starter motor spins without turning engine
Flat battery
Starter motor pinion sticking on sleeve
Flywheel gear teeth damaged or worn
Starter motor mounting bolts loose

Engine turns normally but fails to start
Damp or dirty HT leads and distributor cap (crank engine and check for spark)
Dirty or incorrectly gapped distributor points (if applicable)
No fuel in tank (check for delivery at carburettor)
Excessive choke (hot engine) or insufficient choke (cold engine)
Fouled or incorrectly gapped spark plugs (remove, clean and regap)
Other ignition system fault (see Chapter 4)
Other fuel system fault (see Chapter 3)
Poor compression (see Chapter 1)
Major mechanical failure (eg camshaft drive)

Engine fires but will not run
Insufficient choke (cold engine)
Air leaks at carburettor or inlet manifold
Fuel starvation (see Chapter 3)
Ballast resistor defective, or other ignition fault (see Chapter 4)

Engine cuts out and will not restart

Engine cuts out suddenly – ignition fault
Loose or disconnected LT wires
Wet HT leads or distributor cap (after traversing water splash)
Coil failure (check for spark)
Other ignition fault (see Chapter 4)

Engine misfires before cutting out – fuel fault
Fuel tank empty
Fuel pump defective or filter blocked (check for delivery)
Fuel tank filler vent blocked (suction will be evident on releasing cap)
Carburettor needle valve sticking
Carburettor jets blocked (fuel contaminated)
Other fuel system fault (see Chapter 3)

Engine cuts out – other causes
Serious overheating
Major mechanical failure (eg camshaft drive)

Engine overheats

Ignition (no-charge) warning light illuminated
Slack or broken drivebelt – retension or renew (Chapter 12)

Ignition warning light not illuminated
Coolant loss due to internal or external leakage (see Chapter 2)
Thermostat defective
Low oil level
Brakes binding
Radiator clogged externally or internally
Electric cooling fan not operating correctly
Engine waterways clogged
Ignition timing incorrect or automatic advance malfunctioning
Mixture too weak

Note: *Do not add cold water to an overheated engine or damage may result*

Low engine oil pressure

Gauge reads low or warning light illuminated with engine running
Oil level low or incorrect grade
Defective gauge or sender unit
Wire to sender unit earthed
Engine overheating
Oil filter clogged or bypass valve defective
Oil pressure relief valve defective
Oil pick-up strainer clogged
Oil pump worn or mountings loose
Worn main or big-end bearings

Note: *Low oil pressure in a high-mileage engine at tickover is not necessarily a cause for concern. Sudden pressure loss at speed is far more significant. In any event, check the gauge or warning light sender before condemning the engine.*

Engine noises

Pre-ignition (pinking) on acceleration
Incorrect grade of fuel
Ignition timing incorrect
Worn or maladjusted carburettor
Excessive carbon build-up in engine

Whistling or wheezing noises
Leaking vacuum hose
Leaking carburettor or manifold gasket
Blowing head gasket

Tapping or rattling
Incorrect valve clearances
Worn valve gear
Worn riming chain or belt
Broken piston ring (ticking noise)

Knocking or thumping
Unintentional mechanical contact (eg fan blades)
Worn drivebelt
Peripheral component fault (alternator, water pump etc)
Worn big-end bearings (regular heavy knocking, perhaps less under load)
Worn main bearings (rumbling and knocking, perhaps worsening under load)
Piston slap (most noticeable when cold)

Chapter 1 Engine

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Specifications

XU52C engine

General

Type	Four-cylinder, in-line, overhead camshaft. All alloy with wet cylinder liners. Mounted transversely and inclined 30° to rear. Transmission mounted on left-hand end of engine
Code	XU52C
Model	B2A
Displacement	1580 cc (96.4 cu in)
Number of cylinders	4
Bore	83.0 mm
Stroke	73.0 mm
Compression ratio	8.95:1
Maximum power (DIN)	68 kW (92 bhp) at 6000 rpm
Maximum torque (DIN)	134 Nm (99 lbf ft) at 2800 rpm
Firing order	1-3-4-2 (No. one at flywheel end)

Camshaft

Drive	Toothed belt
Number of bearings	5
Endfloat	0.07 to 0.16 mm (non-adjustable)
Bearing clearance	0.05 mm

Connecting rods

Material	Forged steel
Length	150.5 mm

Crankshaft

Main journal diameter:	
New	60.000 mm (nominal)
After regrind	59.681 to 59.700 mm
Crankpin diameter:	
New	44.991 to 45.000 mm
After regrind	44.675 to 44.700 mm
Maximum main journal or crankpin out of round	0.007 mm
Endfloat	0.07 to 0.27 mm
Thrustwasher thickness available	2.35, 2.40, 2.45 and 2.50 mm

Cylinder liners

Type	Wet, removable, matched to pistons
Liner protrusion	0.03 to 0.10 mm
Maximum difference between adjacent liners	0.05 mm
Liner internal diameter:	
Class A	83.000 to 83.010 mm
Class B	83.010 to 83.020 mm
Class C	83.020 to 83.030 mm

Pistons

Type	Aluminium alloy with two compression rings and one scraper ring
Piston diameter (measured 13.0 mm from lowest part of skirt):	
Class A	82.953 to 82.967 mm
Class B	82.963 to 82.977 mm
Class C	82.973 to 82.987 mm

Gudgeon pin

Diameter	21.994 to 22.000 mm
Fit in piston	Clearance
Fit in connecting rod	Interference

Cylinder head

Material	Aluminium alloy
Height:	
New	158.93 mm
Minimum after reface	158.73 mm
Maximum distortion	0.05 mm
Cylinder head gasket thickness:	
For standard head	1.2 mm
For machined head	1.4 mm

Valves

Note: *No machining of exhaust valves is possible*

Head diameter:	
Inlet	41.6 mm
Exhaust	34.5 mm
Stem diameter:	
Inlet and exhaust	8.0 mm
Valve clearances (cold):	
Inlet	0.15 to 0.25 mm (0.006 to 0.010 in)
Exhaust	0.35 to 0.45 mm (0.013 to 0.017 in)
Valve stem-to-guide clearance:	
Inlet	0.018 to 0.035 mm
Exhaust	0.038 to 0.055 mm
Valve lift:	
Inlet and exhaust	9.70 mm
Valve timing:	
Inlet valve opens	6° 30′ BTDC
Inlet valve closes	31° 18′ ABDC
Exhaust valve opens	41° 18′ BBDC
Exhaust valve closes	3° 30′ ATDC

Lubrication

Type	Wet sump, pressure feed and splash
Filter	Full flow, disposable cartridge (Champion F104)
Sump capacity	5.0 litre (8.8 pint)
Lubricant type/specification	Multigrade engine oil, viscosity SAE 10W/40, to API SF or better (Duckhams QXR, Hypergrade, or 10W/40 Motor Oil)
Oil pressure	3.5 bar (50.7 lbf/in^2) at 4000 rpm
Oil pump drive	Chain from crankshaft

XU92C engine
As XU52C engine except for the following

General

Code	XU92C
Model	D2D
Displacement	1905 cc (116.2 cu in)
Bore	83.0 mm
Stroke	88.0 mm
Compression ratio	9.3:1
Maximum power (DIN)	82 kW (110 bhp) at 6000 rpm
Maximum torque (DIN)	162 Nm (119 lbf ft) at 3000 rpm

Connecting rod

Length	143.0 mm

Crankshaft

Crankpin diameter:	
New	50.000 mm (nominal)
After regrind	49.684 to 49.700 mm

Valve timing

Inlet valve opens	3° BTDC
Inlet valve closes	46° ABDC
Exhaust valve opens	40° 8′ BBDC
Exhaust valve closes	2° 2′ ATDC

XU9J2 engine
As XU92C engine except for the following

General

Code	XU9J2
Model	D6A
Maximum power (DIN)	93kW (125 bhp) at 5500 rpm
Maximum torque (DIN)	174 Nm (128 lbf ft) at 4500 rpm

Valve timing

Inlet valve opens	6° 6′ BTDC
Inlet valve closes	48° ATDC
Exhaust valve opens	43° 14′ BBDC
Exhaust valve closes	1° 6′ ATDC

XU9J4 engine
As XU9J2 engine except for the following

General

Type	Sixteen valve, double overhead camshaft acting on hydraulic tappets
Code	XU9J4
Model	D6C
Compression ratio	10.4:1
Maximum power (DIN)	118 kW (160 bhp) at 6500 rpm
Maximum torque (DIN)	180 Nm (133 lbf ft) at 5000 rpm

Camshafts

Type	Double, overhead
Drive	Single toothed belt
Number of bearings	Five per shaft
Endfloat	Not available
Bearing clearance	Not available

Pistons

Piston diameter (measured 13.0 mm from lowest part of skirt):	
Class A	82.963 to 82.977 mm
Class B	82.973 to 82.987 mm
Class C	82.983 to 82.997 mm
Gudgeon pin	Not available

Cylinder head

Height (new)	132.0 ± 0.15 mm
Maximum distortion	0.05 mm
Cylinder head gasket thickness:	
For standard head	1.45 mm
For machined head	1.65 mm

Valves

Note: *No machining of exhaust valves possible*

Head diameter:	
Inlet	34.7 mm
Exhaust	29.7 mm
Stem diameter:	
Inlet and exhaust	6.98 mm
Valve length:	
Inlet	104.48 mm
Exhaust	103.00 mm
Stem-to-guide clearance	0.035 to 0.042 mm
Valve timing	Not available

Lubrication

Minimum oil pressure	4.9 bar (71.5 lbf/in^2) at 4000 rpm
Sump capacity	5.3 litre (9.3 pint)

Torque wrench settings	Nm	lbf ft
All except XU9J4		
Engine mountings (left-hand):		
Small nuts	17	13
Large single nut	35	26
Engine mountings (right-hand):		
Mounting-to-cylinder block	45	33
Mounting-to-wing	40	30
Pad securing nut	45	33
Engine mountings (rear):		
Bracket-to-mounting	35	25
Bracket-to-body	45	33
Thermostat/distributor housing	15	11
Camshaft drivebelt tensioner nuts	15	12
Camshaft drivebelt tensioner locknut	15	12
Camshaft thrust fork	10	7
Camshaft sprocket bolt	80	59
Camshaft bearing caps	15	11
Camshaft cover	10	7
Sump drain plug	27	20
Sump bolts	20	15
Crankshaft pulley bolt	110	81
Water pump bolts	15	11
Oil pump bolts	20	15
Lower balljoint nut	30	22
Anti-roll bar lower link bolt	75	55
Oil pressure transmitter	24	17
Clutch cover	25	18
Exhaust manifold	20	15
Inlet manifold	20	15
Front oil seal housing	15	11
Driveshaft intermediate bearing housing-to-cylinder block	25	18
Driveshaft bearing nuts	17	12
Crankshaft main bearings:		
Cap bolts and nuts	50	37
Side bolts	25	18
Crankshaft big-end bearing caps:		
Stage 1	40	30
Stage 2 – slacken, then immediately tighten to	20	15
Stage 3	Tighten by a further 70°	Tighten by a further 70°
Cylinder head bolts:		
Stage 1	60	44
Stage 2 – slacken, then immediately tighten to	20	15
Stage 3	Tighten by a further 300°	Tighten by a further 300°
XU9J4 engine (as above, except for the following)		
Camshaft sprocket bolts	45	33
Camshaft tensioner bolts	20	15
Engine mountings (right-hand bracket-to-cylinder block):		
Small bolts	45	33
Large bolts	72	53
Camshaft drivebelt cover bolts	10	7
Crankshaft pulley/damper bolts	25	18
Crankshaft sprocket bolt	110	81
Power steering pulley bolt	45	33
Non-return valves in cylinder head	15	11
Camshaft bearing cap bolts	10	7
Piston lubrication oil gallery bolts	10	7
Sump spacer bolts	10	7
Driveshaft nut	265	195

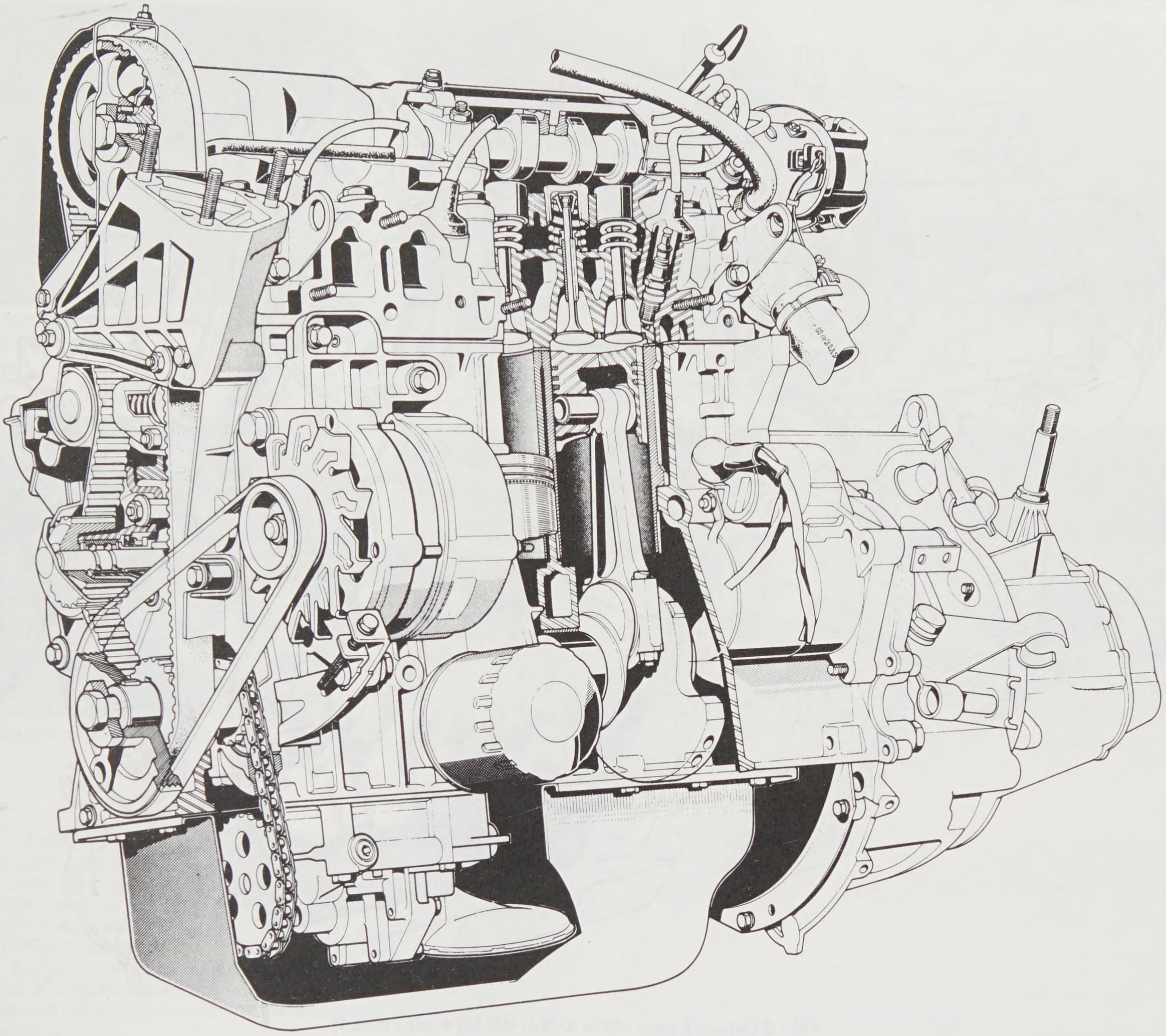


Fig 1.1 Cutaway view of the XU52C engine (Sec 1)

PART A: GENERAL DESCRIPTION AND MAINTENANCE (ALL ENGINES)

1 General description

XU52C, XU92C and XU9J2 engines

The XU engine fitted to the Peugeot 405 range of vehicles is basically the same engine in all applications, the increase in size being obtained by increasing the stroke for the larger XU9 engines. In the engine code numbers, 2C stands for carburettor versions and J2 for fuel-injected types.

The engine is mounted transversely, driving the front wheels, and it is inclined to the rear at an angle of 30° from vertical.

The transmission is also mounted transversely in line with and on the left-hand end of the engine. The final drive unit is integral with the transmission and transmits drive to the front wheels via driveshafts.

The engine has four wet liner cylinders, a five-bearing crankshaft and an overhead camshaft.

Camshaft drive is by toothed belt. The belt is tensioned by a spring loaded wheel and also drives the coolant pump. The camshaft operates directly on bucket tappets; valve clearance adjustment is by shims inserted between the tappet and the valve stem. The distributor is driven directly from the tail of the camshaft.

The oil pump is located in the sump and is chain driven from the crankshaft. A forced feed lubrication system is employed. Oil from the pump passes to the oil filter then to the oil gallery, crankshaft and camshaft. The valve stems are lubricated by oil returning from the camshaft to the sump. The oil pump chain and sprockets are lubricated by oil in the sump.

XU9J4 engine

The XU9J4 engine is a development of the XU9J2 engine with which it shares many common features.

The most obvious difference is the sixteen valve, twin overhead camshaft cylinder head. Each of the four cylinders has two inlet valves and two exhaust valves, operated by hydraulic tappets via the twin camshafts which are driven by a single toothed belt from the crankshaft. The hydraulic tappets eliminate the need for routine valve clearance checking or adjusting. The combustion chambers have siamesed inlet ports and separate exhaust ports, improving gas flow through the cylinder head.

Engine lubrication is by forced feed from a crankshaft driven oil pump and includes the fitting of four oil galleries in the crankcase which

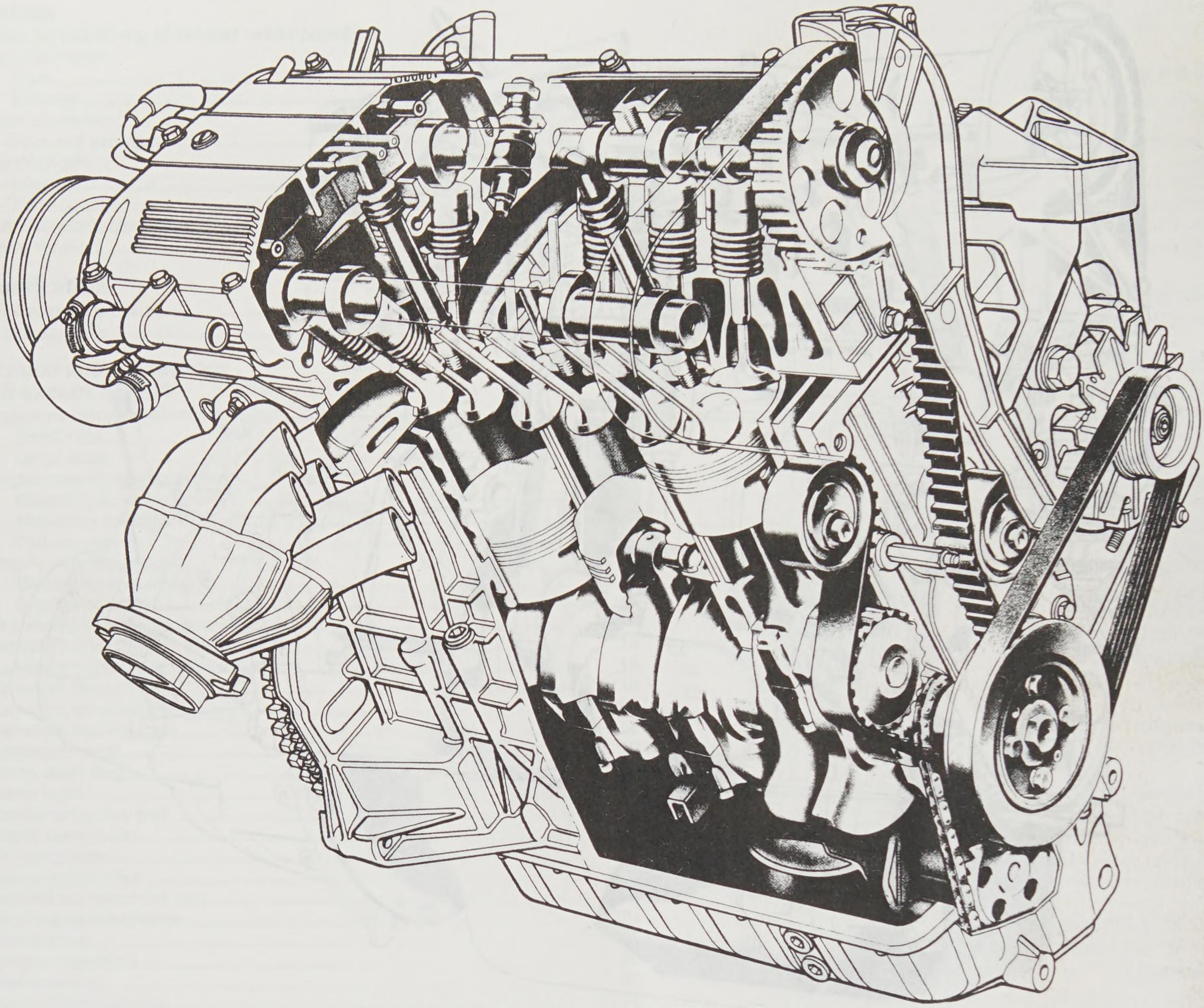


Fig 1.2 Cutaway view of the XU9J4 (Mi 16) engine (Sec 1)

spray oil onto the underside of the pistons for increased heat dispersal. The inclusion of an oil cooler mounted under the oil filter and connected to the vehicle cooling system further enhances engine cooling.

A torsional damper fitted to the crankshaft pulley reduces crankshaft vibration. A further distinguishing feature is the power steering hydraulic pump drive, which is by pulley from the exhaust camshaft.

2 Maintenance and inspection

At the intervals laid down in the 'Routine maintenance' *Section at the beginning of this manual, carry out the following operations.*

1 With the engine cold, check the engine oil level.

2 Withdraw the dipstick, wipe it dry, then re-insert it fully into the dipstick tube and withdraw it a second time.

3 The oil level in the engine will be evident on the dipstick and should be between the MAX and MIN marks on the lower end of the dipstick (photo).

4 If the level is low, remove the cap from the engine oil filler tube and using a clean funnel, replenish the engine with oil of the correct specification until the level is correct. Remember that it will take some moments for the oil to drain down into the sump and show a true reading on the dipstick, so take care not to overfill (photo).

5 To renew the engine oil, run the engine until it has reached normal operating temperature, the oil will drain more easily and completely in a hot condition; but be wary of splashing hot oil onto the hands, it can scald.

6 Position a suitable container under the sump drain plug, unscrew the drain plug and allow the oil to drain into the container (photo). When disposing of used engine oil, **do not** pour it down the drain – this is illegal and causes pollution. Your dealer or Local Authority may be able to dispose of it safely.

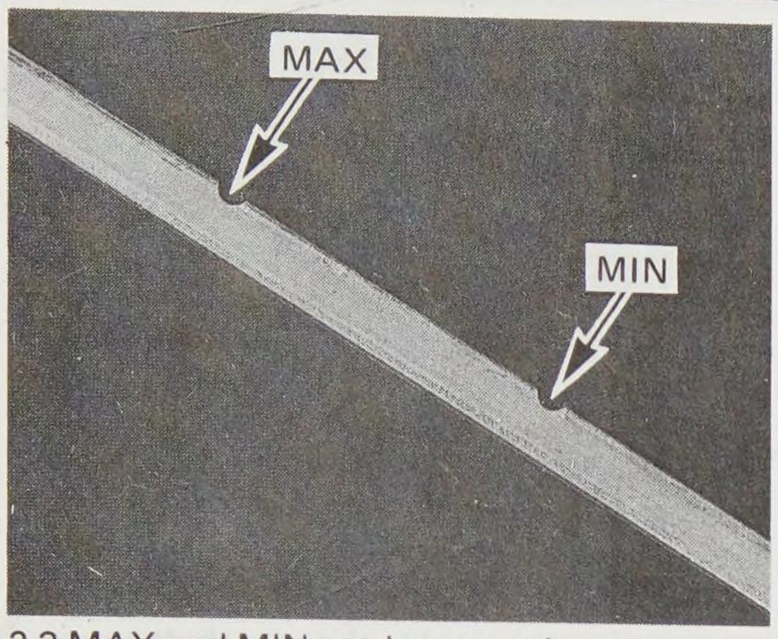
7 Fit a new copper washer to the drain plug and refit the plug when all the oil has drained out, tightening the plug to the specified torque.

8 During normal routine maintenance, the oil filter will be renewed at the same time as the engine oil.

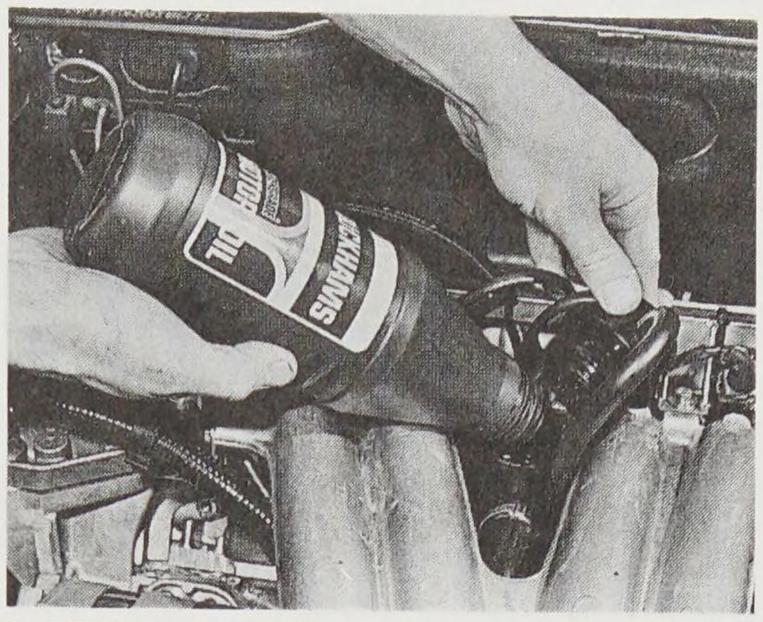
9 Unscrew the oil filter from the side of the cylinder block, placing a suitable container underneath to catch oil spillage (photo).

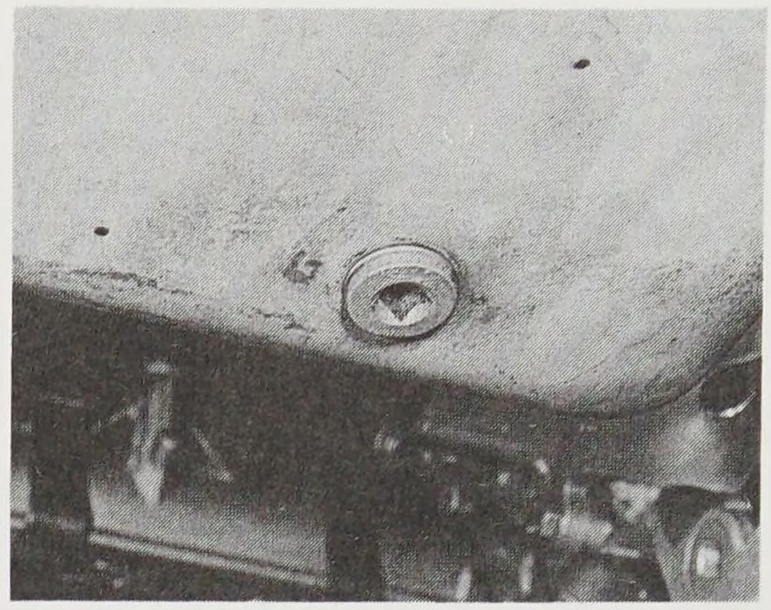
10 If the filter is tight, use a strap or chain wrench to undo it.

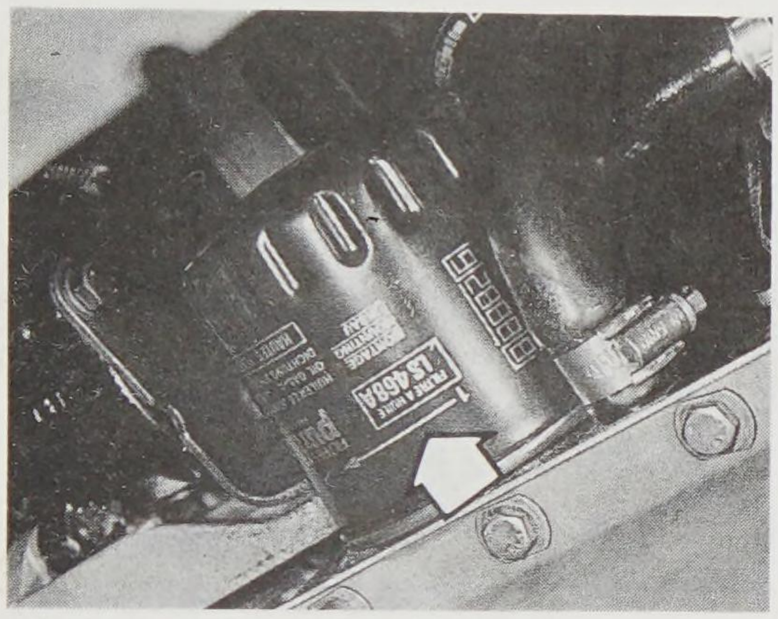
11 Clean the filter mounting ring on the cylinder block, then apply a small amount of engine oil to the sealing ring on the new filter and screw the filter back onto the threaded stud, tightening it using hand pressure only (photos).

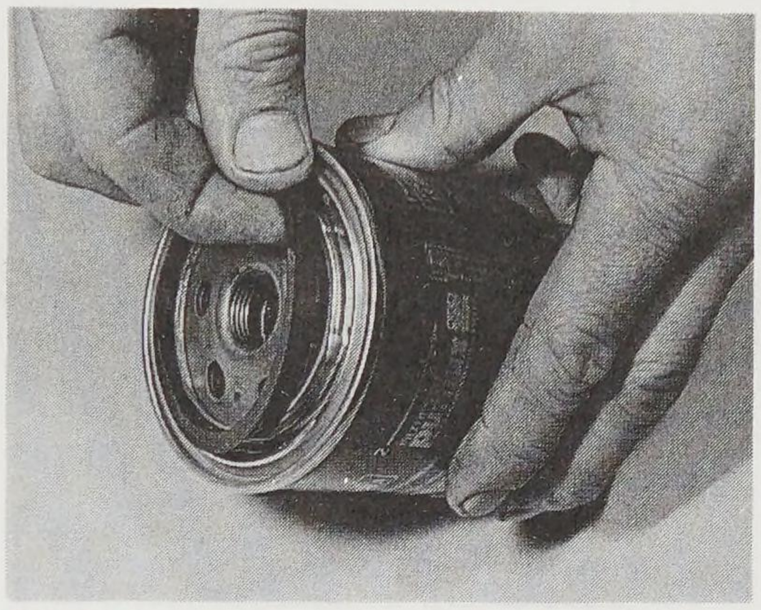


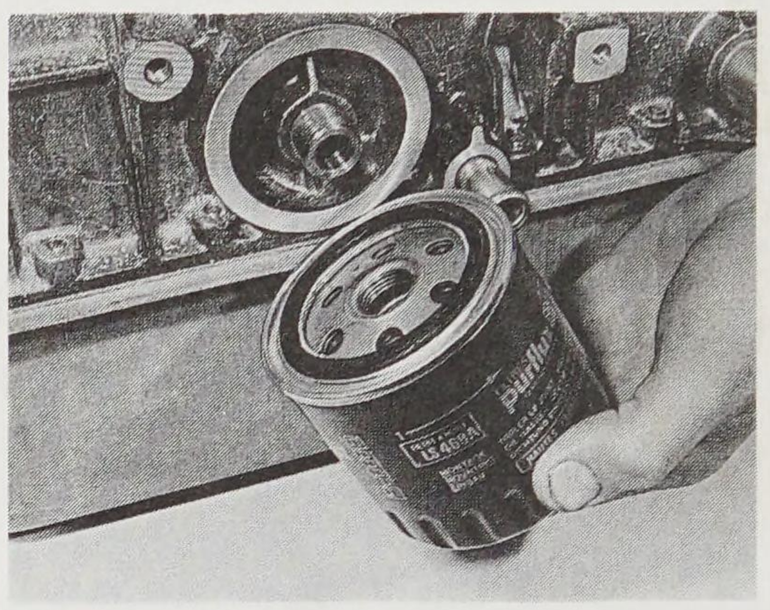
2.3 MAX and MIN marks on engine oil dipstick


2.4 Filling the engine with oil


2.6 Engine oil drain plug


2.9 Engine oil filter (arrowed)


2.11A Fitting the oil seal to the filter ...


2.11B ... and the filter to the engine

12 Fill the engine to the MAX mark on the dipstick with the specified oil as previously described.
13 Start the engine and allow it to idle. Give the engine time to warm up then check the drainplug and filter for leaks. It should be noted that the oil pressure warning lamp will remain on longer than normal while the oil filter fills with oil.
14 Switch off the engine and recheck the oil level when the engine has cooled. It is appreciated that some models have an oil level gauge, but this should not always be regarded as an accurate method of checking the oil level.
15 Inspect the crankcase breather hoses for cracking, splitting, swelling etc and for the security of their end connections. On high mileage vehicles where the hoses have become clogged they should be removed and cleaned out (Section 17).
16 On some models, a wire mesh filter is incorporated in the oil filler cap. This filter has been deleted on later models as it could cause a blockage due to freezing in cold weather. If one is found in the filler cap, remove and discard it.
17 Also at the specified intervals, renew the camshaft drivebelt (Section 5 or 23).

PART B: XU52C, XU92C AND XU9J2 ENGINES

3 Operations possible without removing the engine from the car

The following items can be removed and refitted with the engine in the car:

(a) Cylinder head
(b) Camshaft drivebelt and camshaft
(c) Sump and oil pump
(d) Flywheel/driveplate (after removal of transmission)

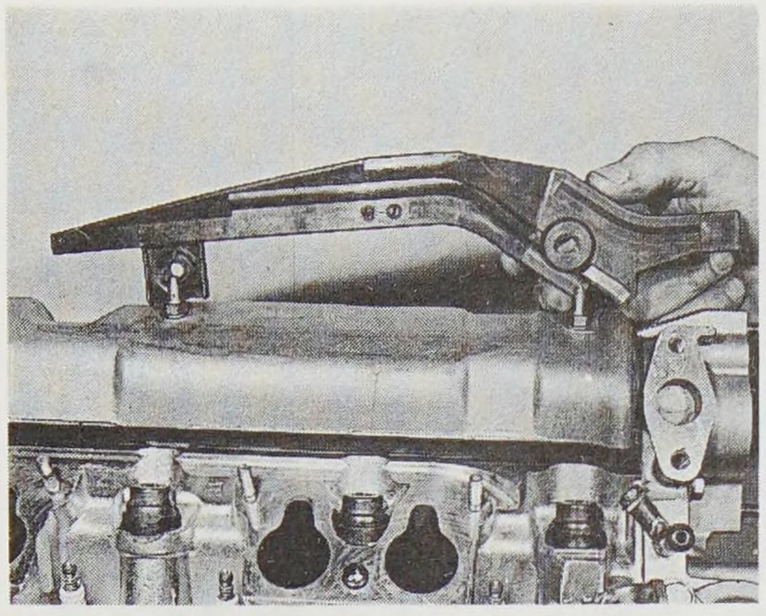
Since the sump and cylinder head can be removed *in situ,* it is possible to renew the pistons, liners and big-end bearings without removing the engine. Such work is not recommended, however, since it can be performed more easily with the engine on the bench.

4 Camshaft cover – removal and refitting

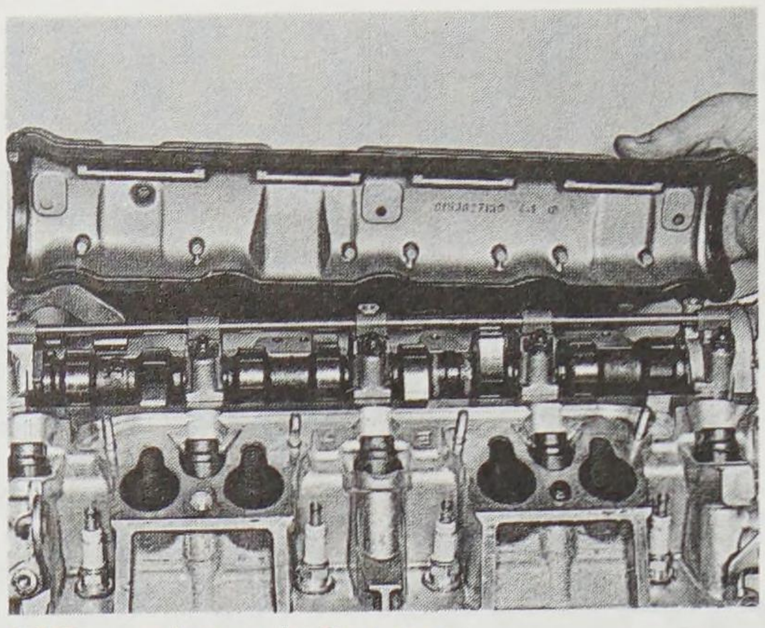
1 Disconnect the spark plug HT leads and unclip them from the plastic guide channel. Lay the leads to one side.
2 Disconnect the breather hose.
3 Unclip the diagnostic socket and lay it aside.
4 Make a note of where and under which nuts the brackets and HT lead guide channels fit.
5 Unbolt the camshaft cover and lift off the guide channel, brackets and camshaft cover (photos).
6 Refitting is a reversal of removal, using a new seal on the camshaft cover if the old one is not in good condition (photo).

5 Camshaft drivebelt – removal and refitting

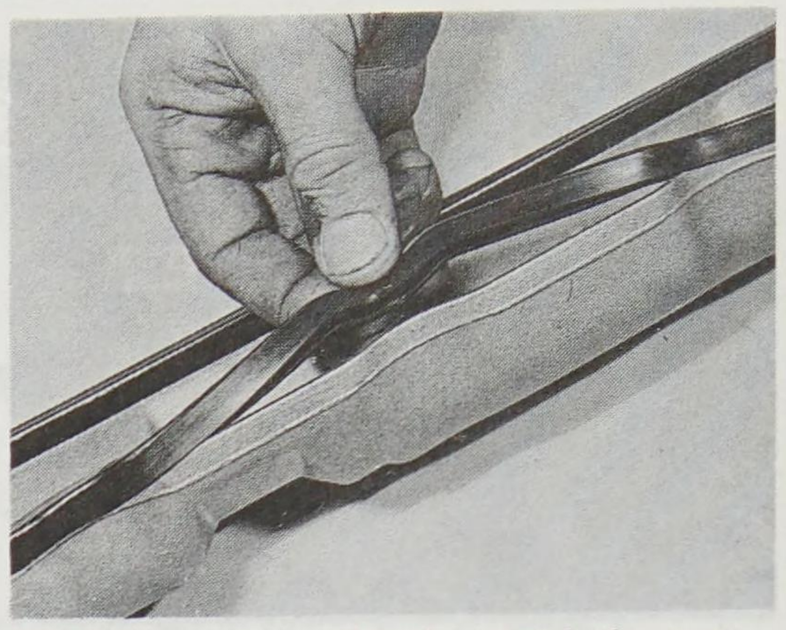
1 The camshaft drivebelt must be renewed at the intervals specified in the *'Routine maintenance'* Section at the beginning of this manual, or if the belt shows signs of cracking, fraying or has become contaminated with oil or grease.
2 Disconnect the battery negative terminal.
3 Raise the vehicle onto axle stands and remove the right-hand road wheel arch liner.
4 Remove the engine underfloor protection panel.
5 Remove the alternator, power steering and air conditioning compressor drivebelts (as applicable).



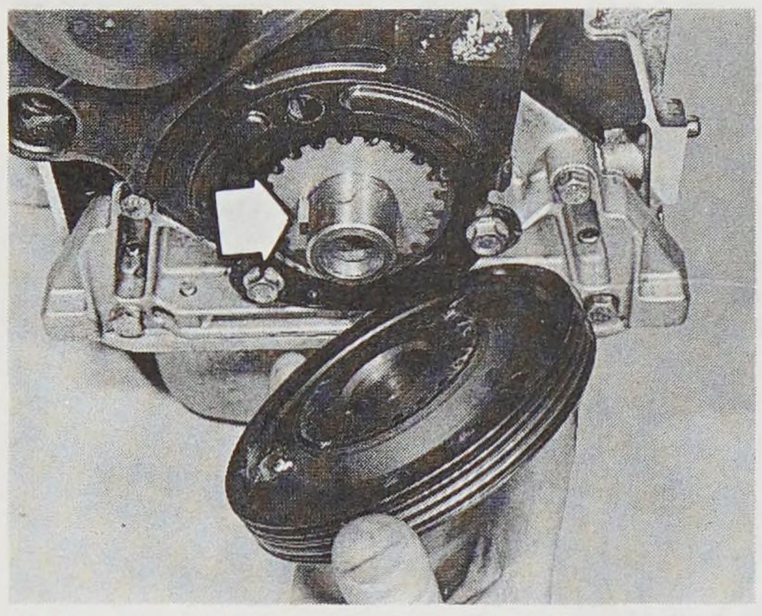
4.5A Lift off the guide channel ...



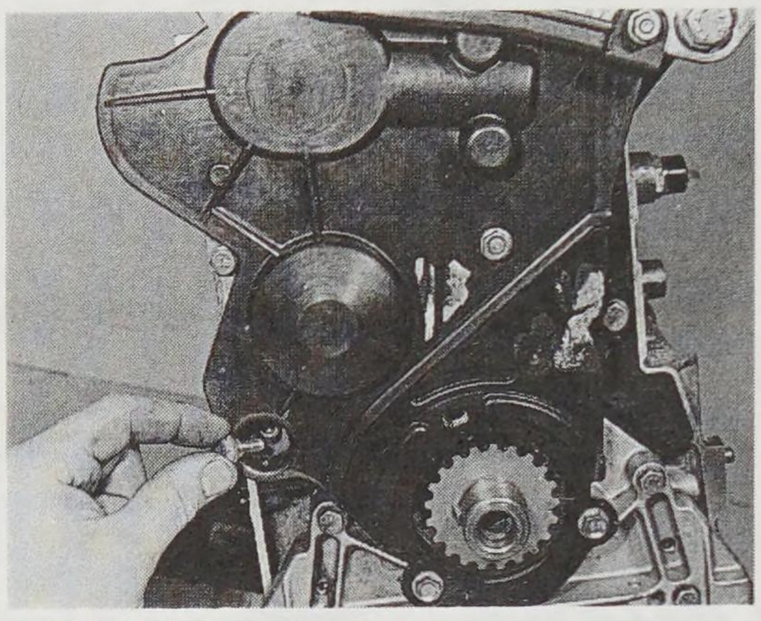
4.5B ... and camshaft cover



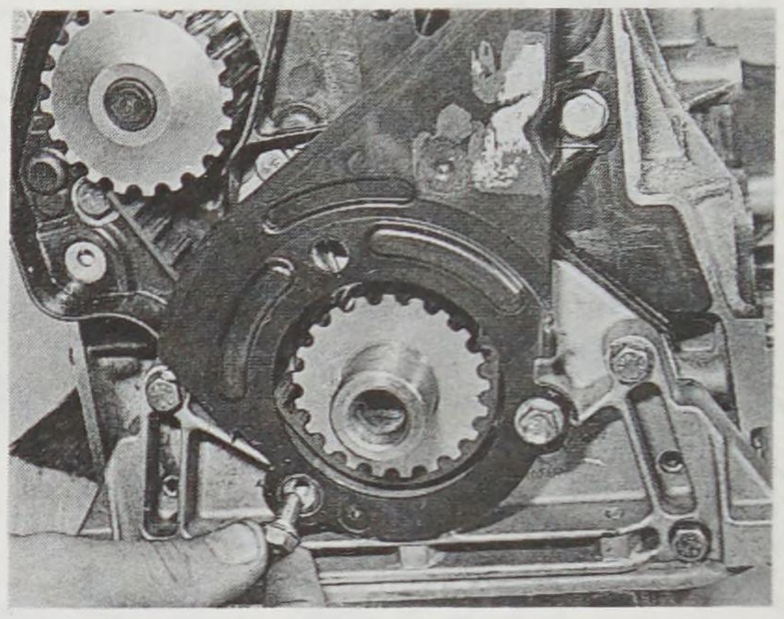
4.6 Fitting a new seal to the camshaft cover



5.11 Removing the crankshaft pulley (Woodruff key arrowed)



5.12A Unbolt and remove ...



5.12B ... the plastic covers

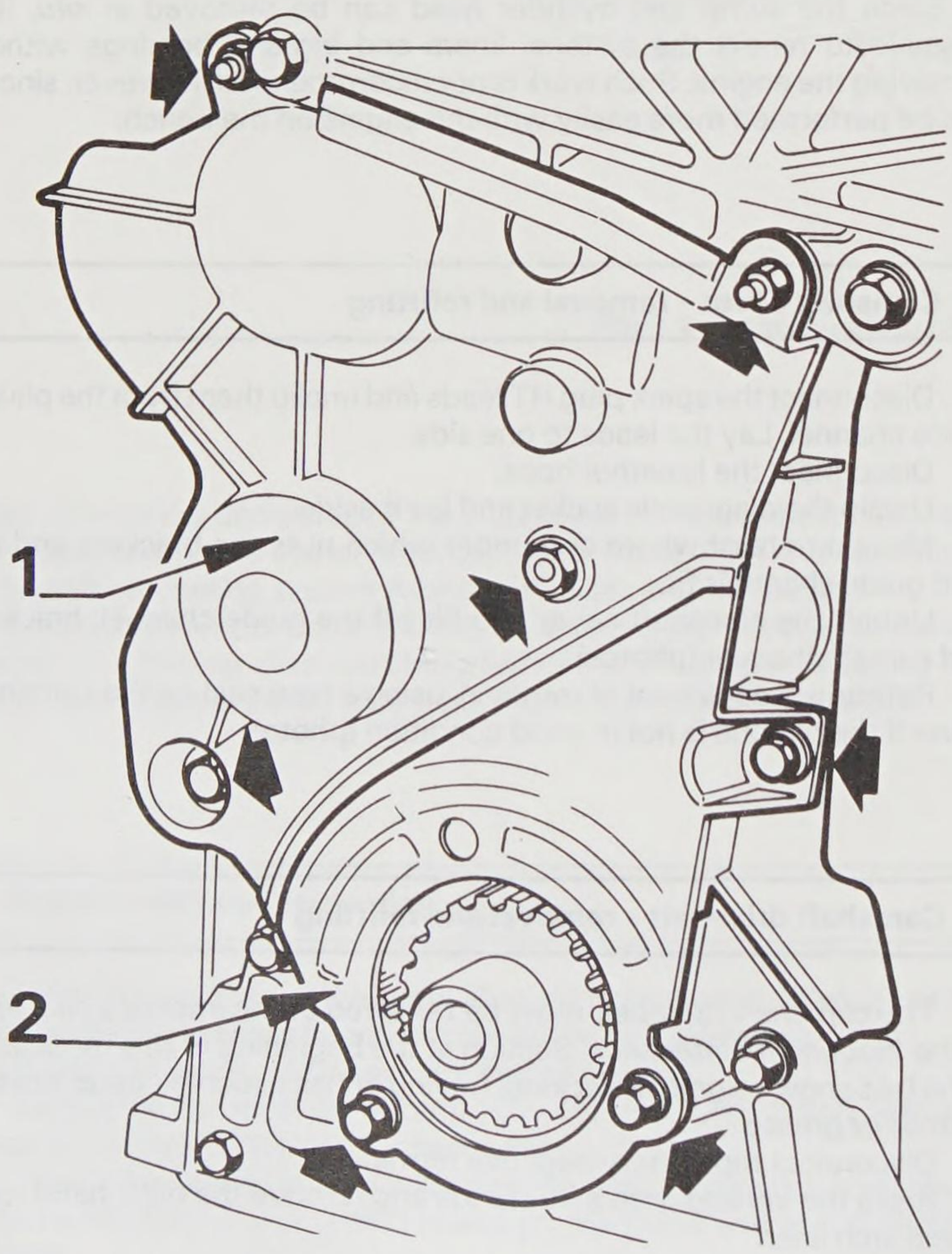


Fig 1.3 Camshaft drivebelt lower covers (1 and 2) with retaining nuts and bolts (arrowed) (Sec 5)

6 Unbolt and remove the camshaft drivebelt top cover.

7 Turn the engine using a socket or ring spanner on the crankshaft pulley bolt until a 10.0 mm dowel (or drill) can be inserted into the timing holes in the crankshaft pulley and camshaft sprocket. Ensure that the dowels will pass right through and into the backplate, but do not leave the dowels in place at this stage.

8 Remove the cover plate from the bottom of the flywheel housing.

9 Have an assistant jam the starter ring gear on the flywheel while the crankshaft pulley bolt is undone. **Caution**: *Do not attempt to undo the pulley bolt using the timing dowels to prevent the engine turning.*

10 Before removing the pulley wheel, recheck the timing alignment and insert the timing dowels as previously described.

11 Remove the pulley wheel and recover the Woodruff key (photo).

12 Unbolt and remove the plastic covers over the lower part of the camshaft drivebelt (photos).

13 Slacken off the two nuts securing the drivebelt tensioner (photo).

14 Loosen the locknut on the tensioner cam then turn the square-headed eccentric to compress the tensioner spring and relieve the tension on the belt. Tighten the locknut (photo).

15 Remove the drivebelt, feeding it underneath the engine mounting bracket. If the belt is to be re-used, be careful not to twist or kink the belt, and keep it free from contamination with oil or grease.

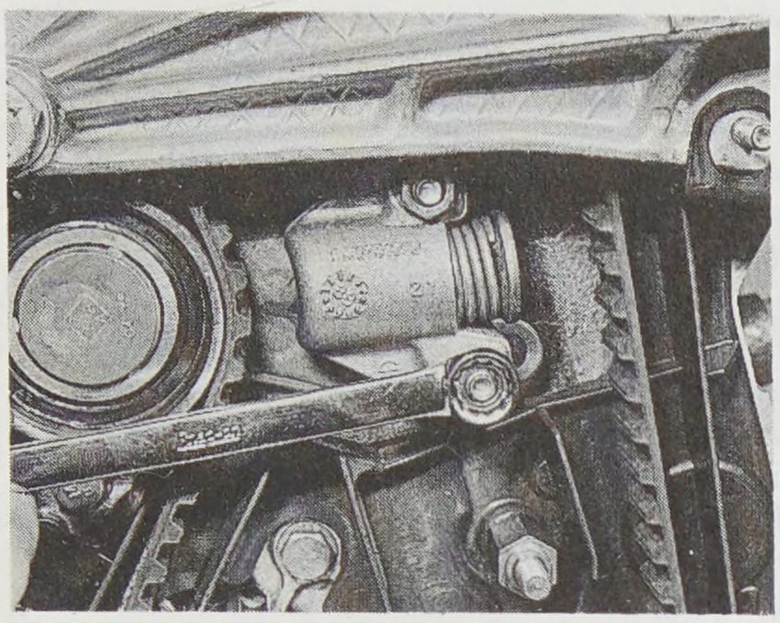
Caution: *With the belt removed, do not attempt to turn the engine over or the valves could hit the pistons with resulting damage.*

16 Commence refitting by checking the alignment of the camshaft and crankshaft pulleys. The crankshaft pulley and Woodruff key will have to be refitted temporarily (photos).

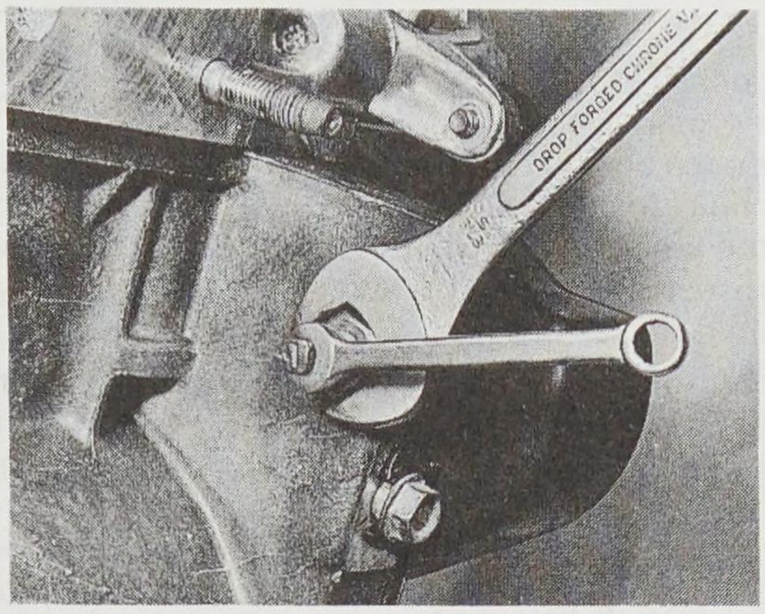
17 Before refitting the belt note that there are alignment marks on the belt and the camshaft and crankshaft sprockets and direction of rotation marks on the belt (photo).

18 Feed the belt up under the engine mounting, then fit it around the camshaft sprocket first, lining up the marks, then around the crankshaft sprocket, then the water pump sprocket and finally the tensioner roller. It is important to use this sequence (photos).

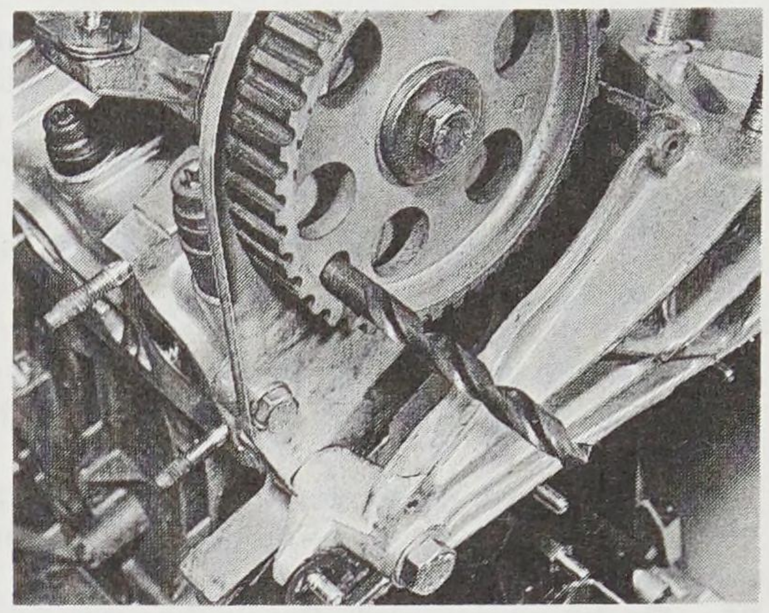
19 Slacken the tensioner cam locknut and turn the square-headed eccentric to release the tensioner spring.



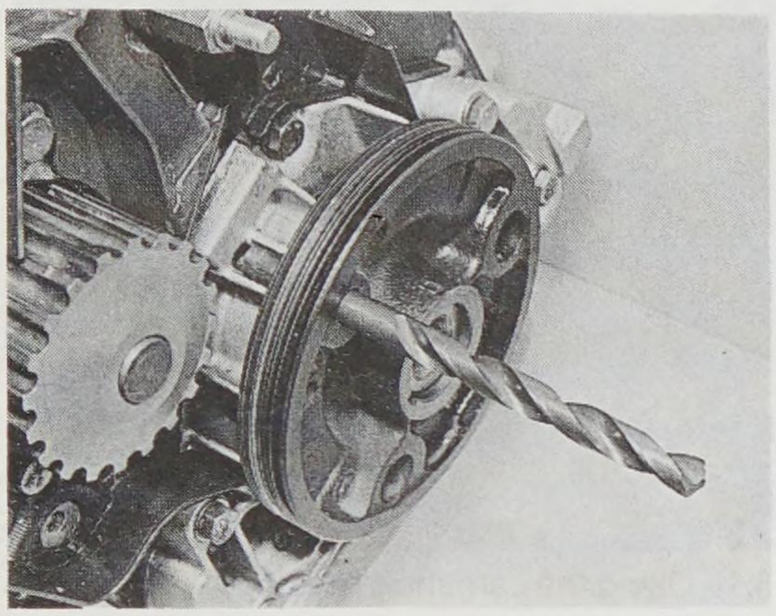
5.13 Slackening off the drivebelt tensioner nuts



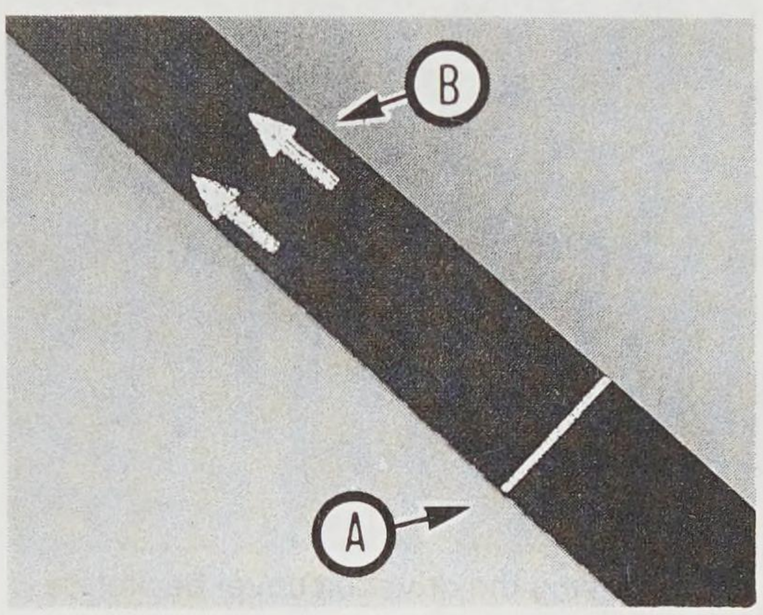
5.14 Compressing the tensioner spring



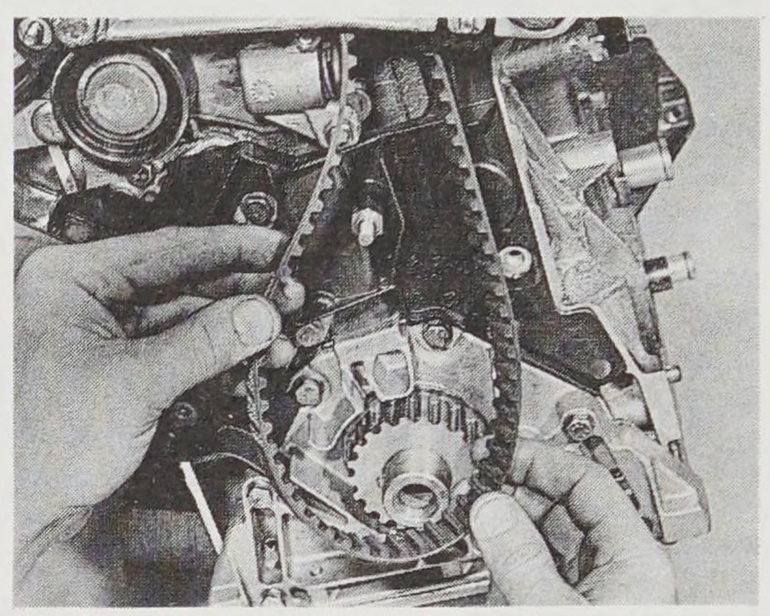
5.16A Checking alignment of camshaft ...



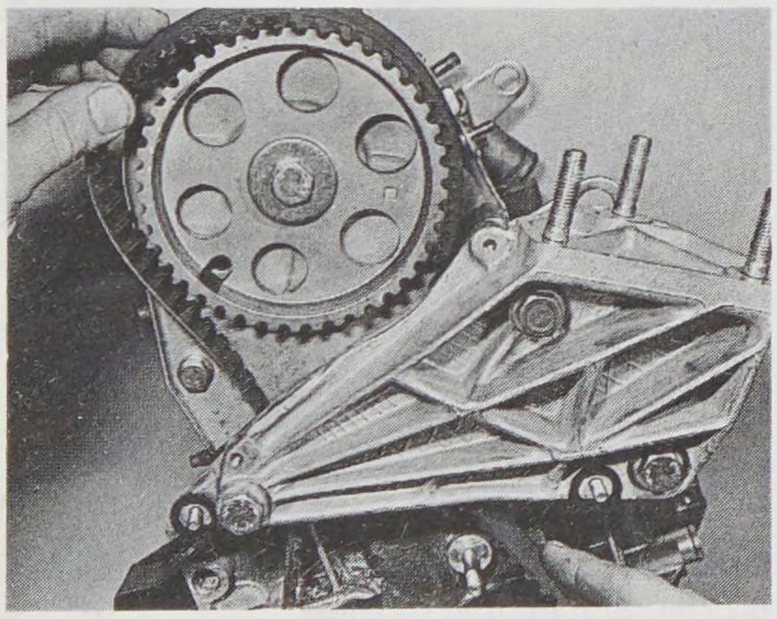
5.16B ... and crankshaft



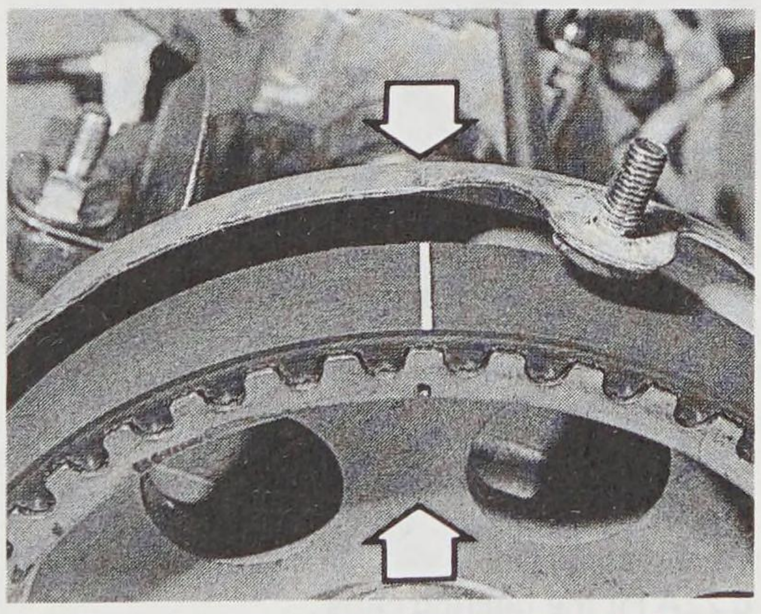
5.17 Alignment mark (A) and direction of rotation arrows (B) on camshaft drivebelt



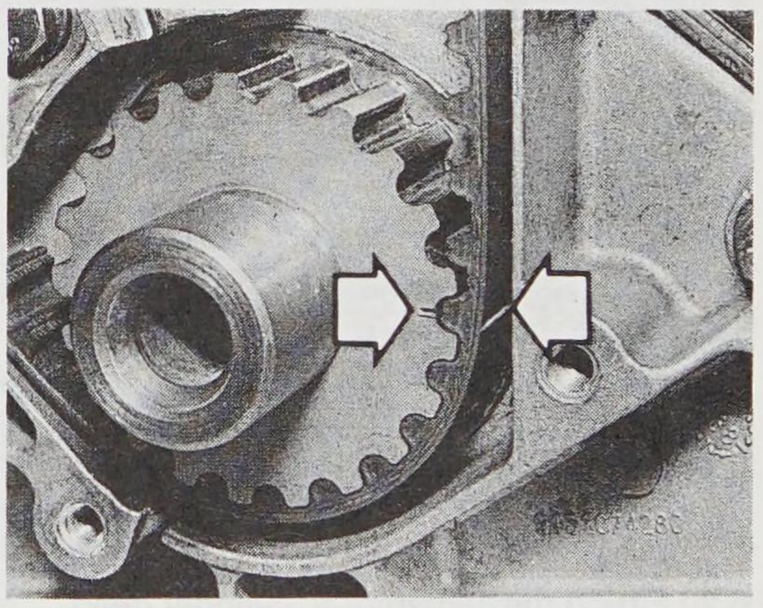
5.18A Feeding the belt ...



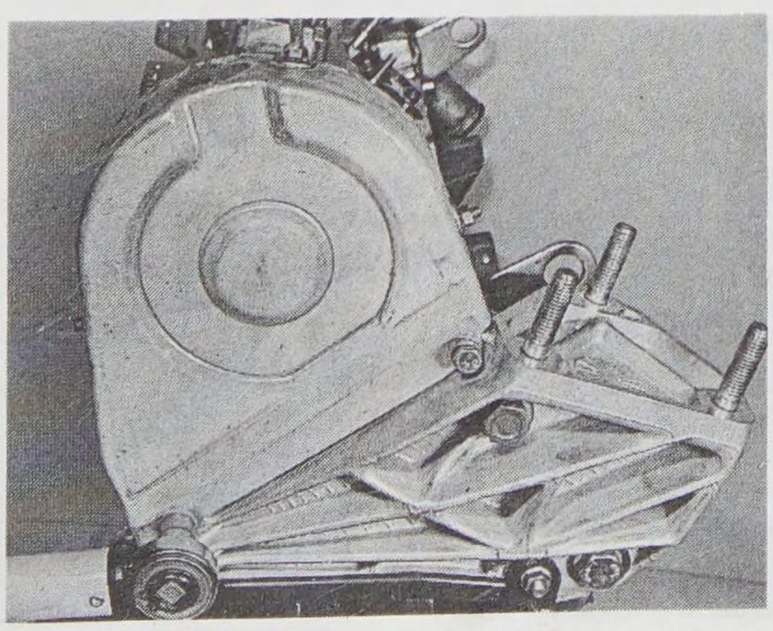
5.18B ... under the engine mounting bracket



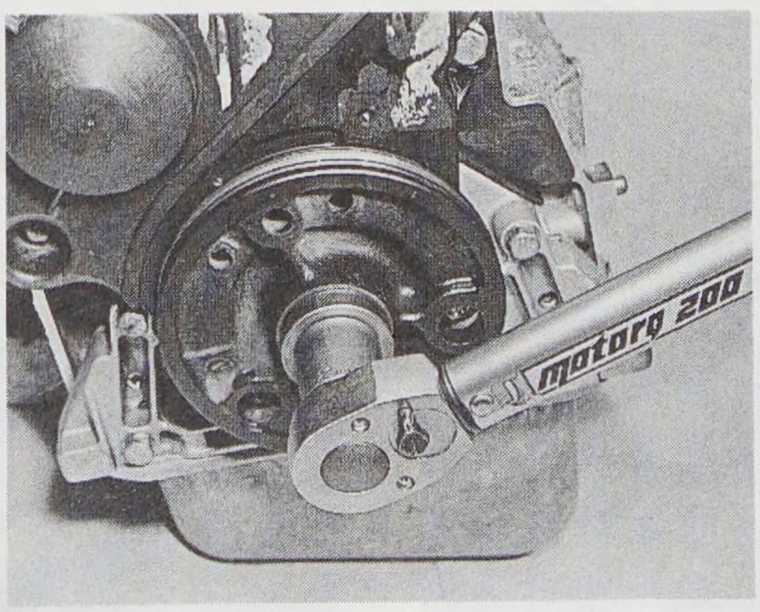
5.18C Line up the marks on the camshaft sprocket and belt (arrowed) ...



5.18D ... and crankshaft sprocket and belt (arrowed)



5.22 Tightening a camshaft drivebelt upper cover bolt



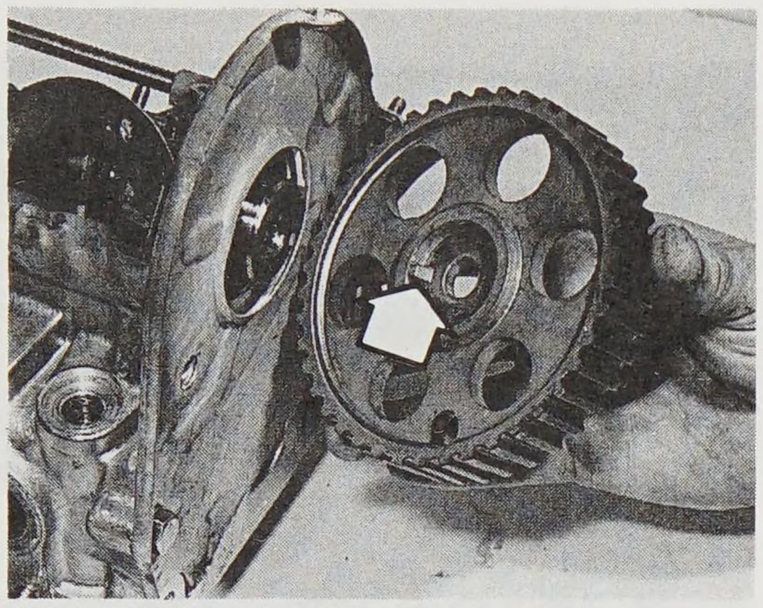
5.23 Tightening the crankshaft pulley bolt

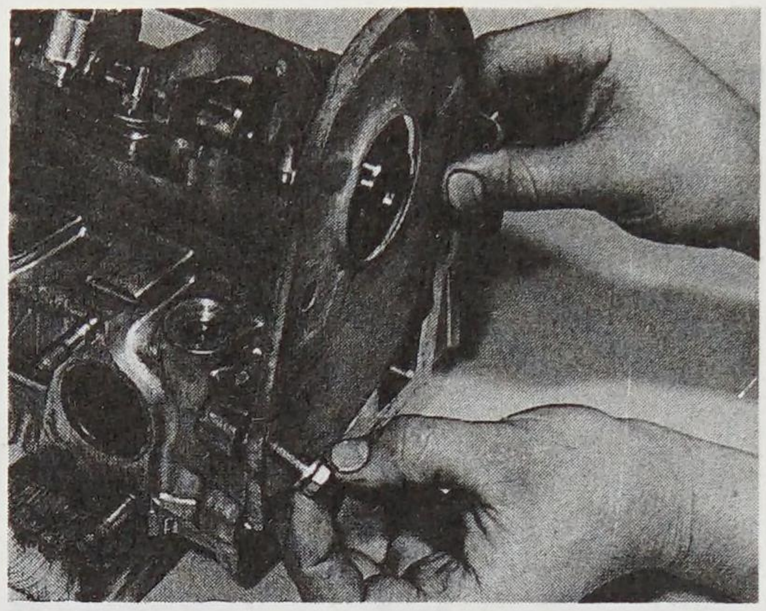
20 Tighten the locknut and tensioner securing nuts.
21 Temporarily refit the crankshaft pulley and Woodruff key. Turn the crankshaft through two complete turns in the normal direction of rotation until No. 1 cylinder (at the flywheel end) is once again at TDC. Slacken the tensioner locknut and the two securing nuts, then retighten them and recheck the alignment of the belt using the timing dowels. If the dowels cannot be inserted freely in both the camshaft sprocket and crankshaft pulley, the whole process must be repeated.
22 Remove the crankshaft pulley and fit the drivebelt covers (photo).
23 Fit the crankshaft pulley and tighten the bolt to the specified torque (photo).
24 Fit the cover plate over the flywheel housing.
25 Fit and adjust the alternator, power steering and air conditioning drivebelts (as applicable).
26 Fit the engine underfloor protection panel, wheelarch liner and road wheel. Remove the vehicle from axle stands.
27 Connect the battery negative terminal.

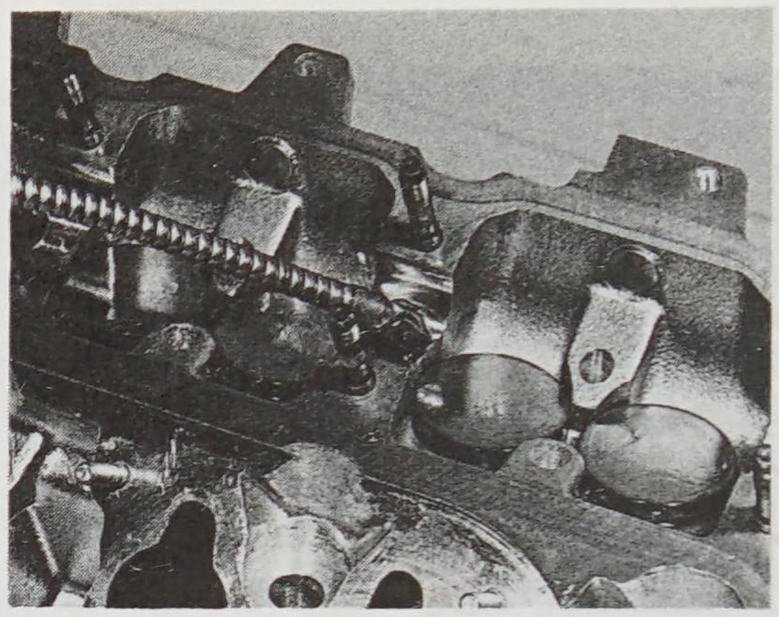
6 Camshaft – removal and refitting

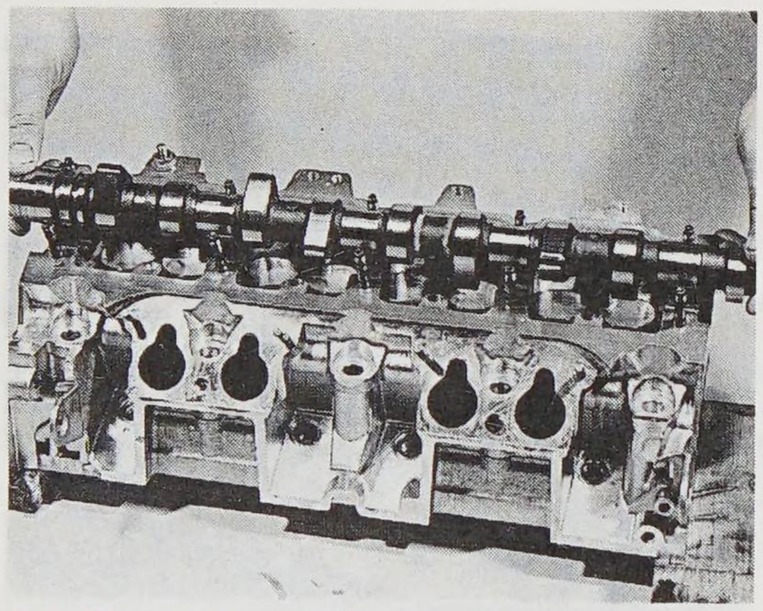
Note: *The camshaft can be removed with the engine in situ. Although the photographic sequence shows the procedure with the cylinder head removed, the text covers both situations.*

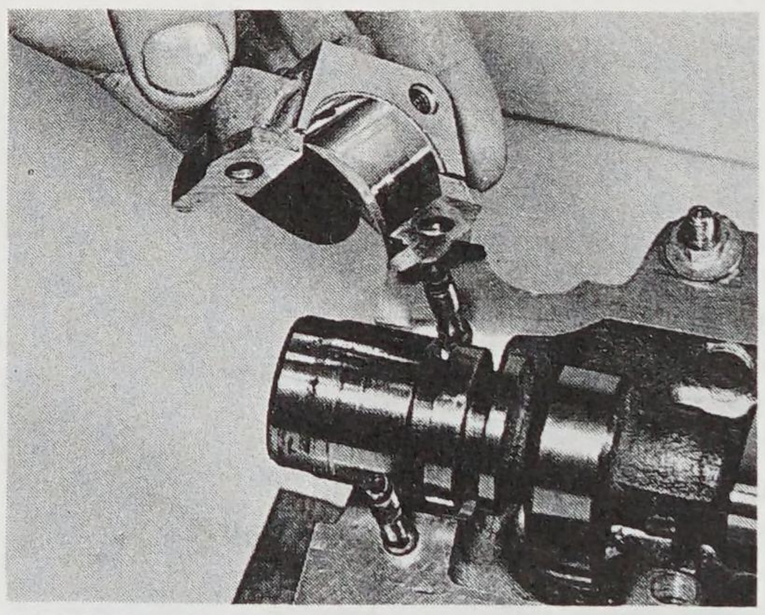
1 Remove the camshaft drivebelt as described in Section 5.
2 Remove the camshaft cover as described in Section 4.
3 Remove the distributor (Chapter 4).
4 On carburettor models, remove the fuel pump (Chapter 3).
5 Remove the recessed Allen screw from the distributor housing.
6 Restrain the camshaft sprocket using a dowel through the timing hole and undo and remove the camshaft sprocket bolt.
7 Remove the sprocket, noting the built-in keyway (photo).
8 Unbolt and remove the camshaft drivebelt cover backplate (photo).
9 Pull out the camshaft lubrication oil gallery.
10 Remove the Allen bolt from the thrust plate and remove the plate.

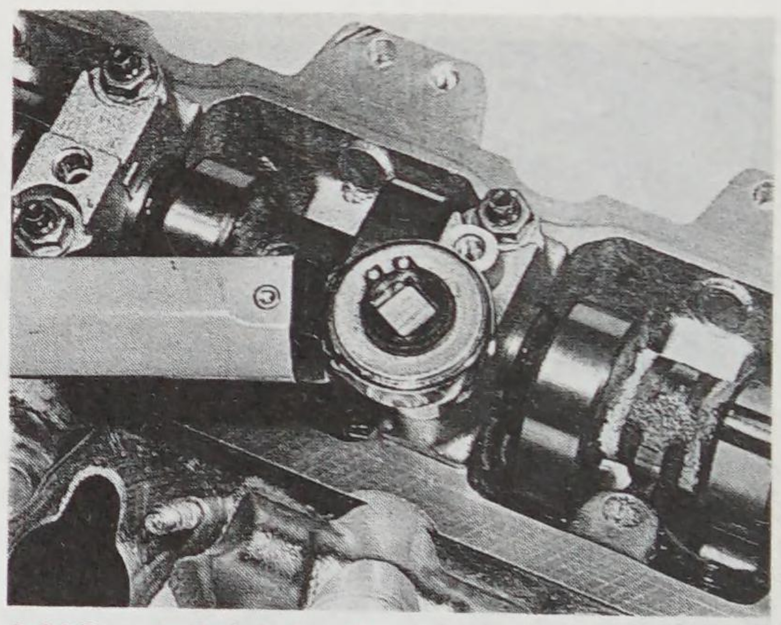

6.7 Camshaft sprocket showing built-in keyway (arrowed)

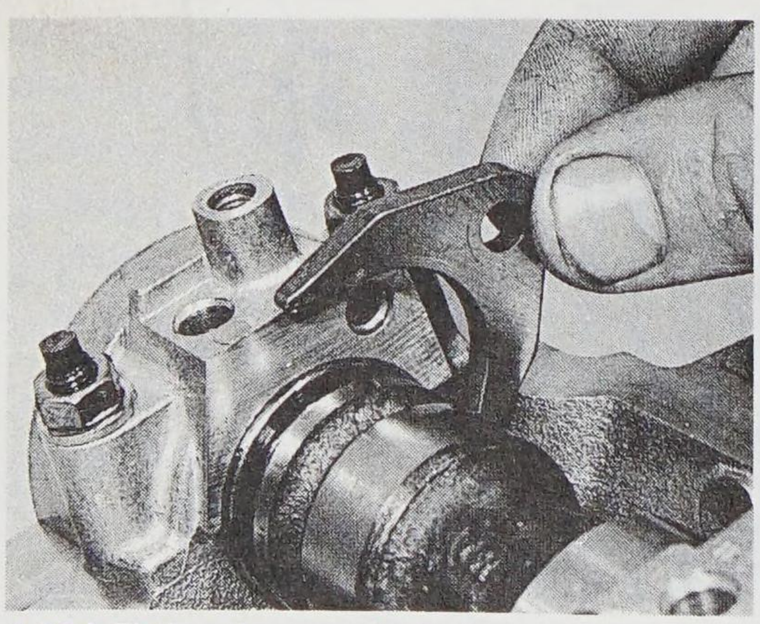

6.8 Removing the drivebelt cover backplate

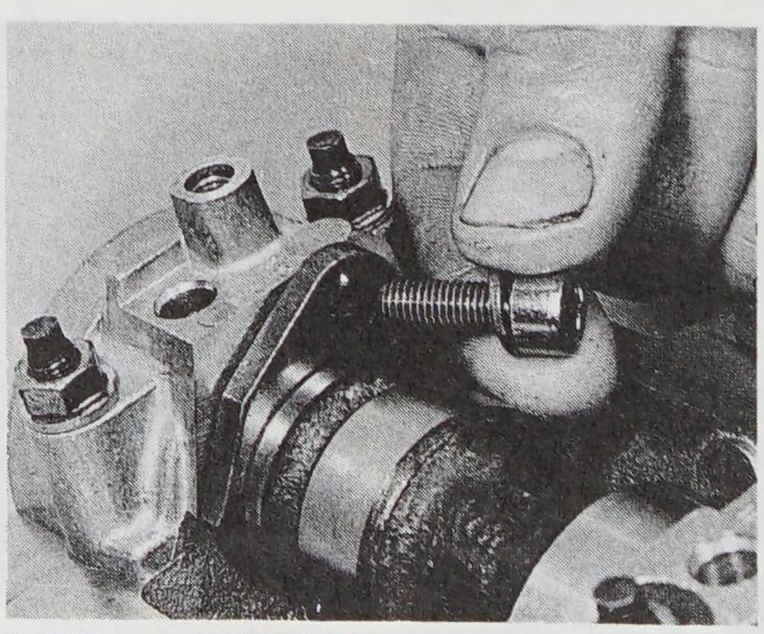

6.19 Oiling the camshaft bearings

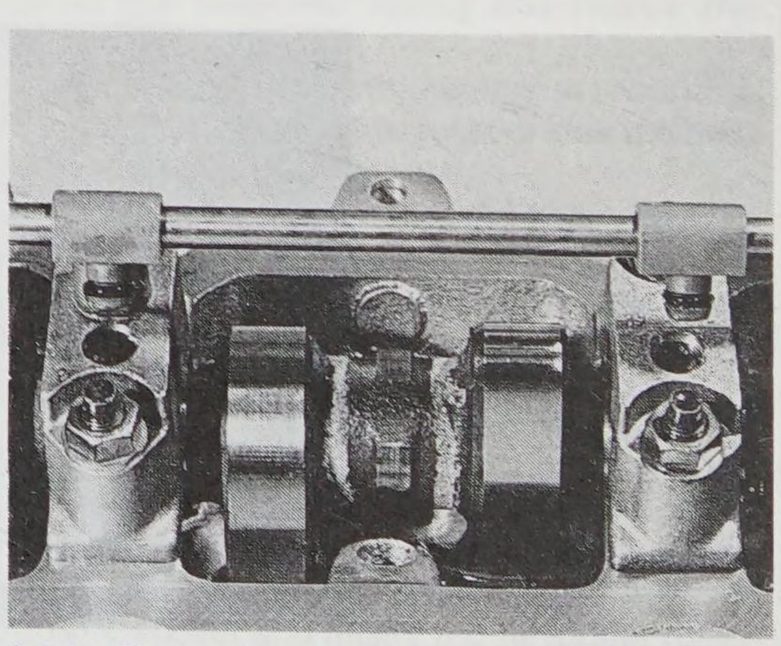

6.20 Fitting the camshaft to cylinder head

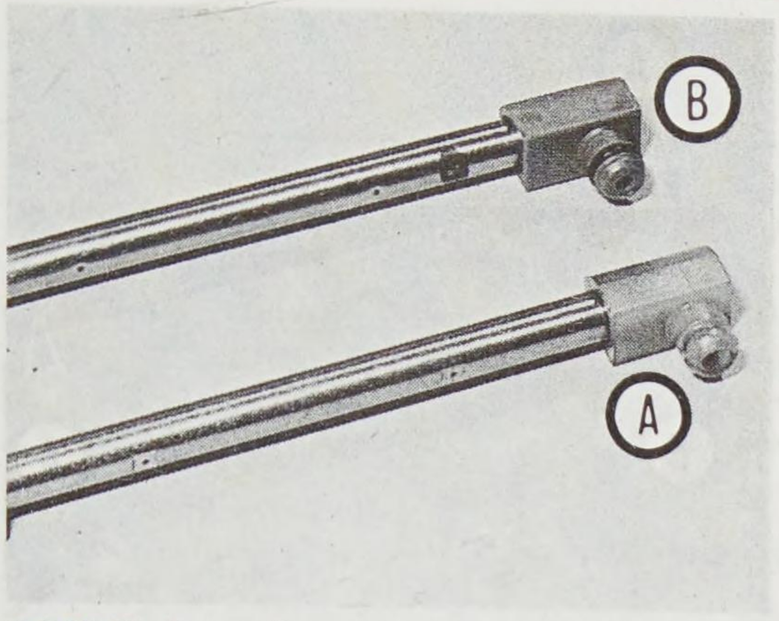

6.22A Fit the bearing caps ...


6.22B ... and tighten the nuts

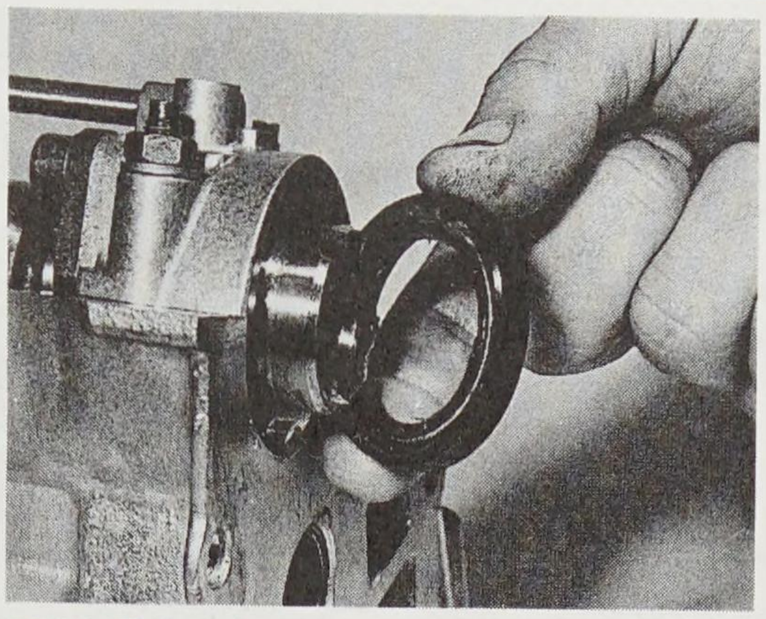

6.23A Fitting the camshaft thrust plate ...


6.23B ... and Allen bolt

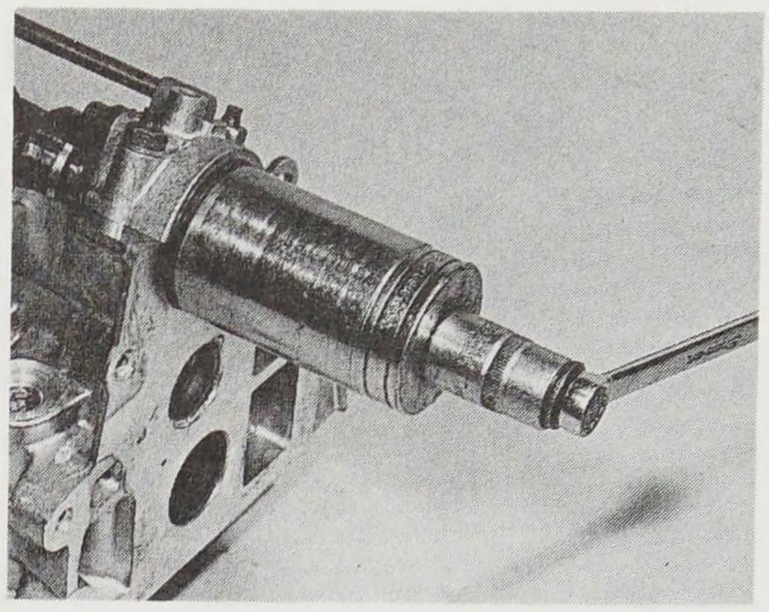

6.24A Fitting the oil gallery



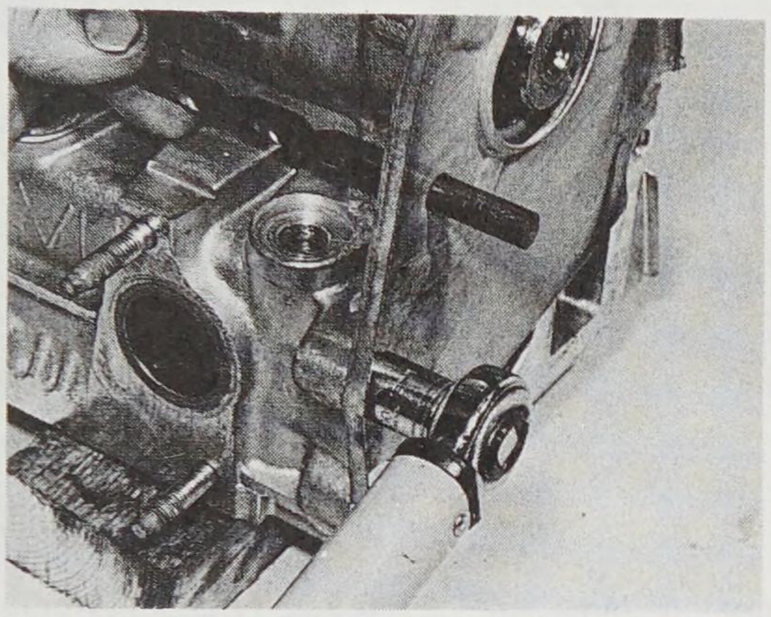
6.24B Earlier gallery without seals (A) and later gallery with seals (B)



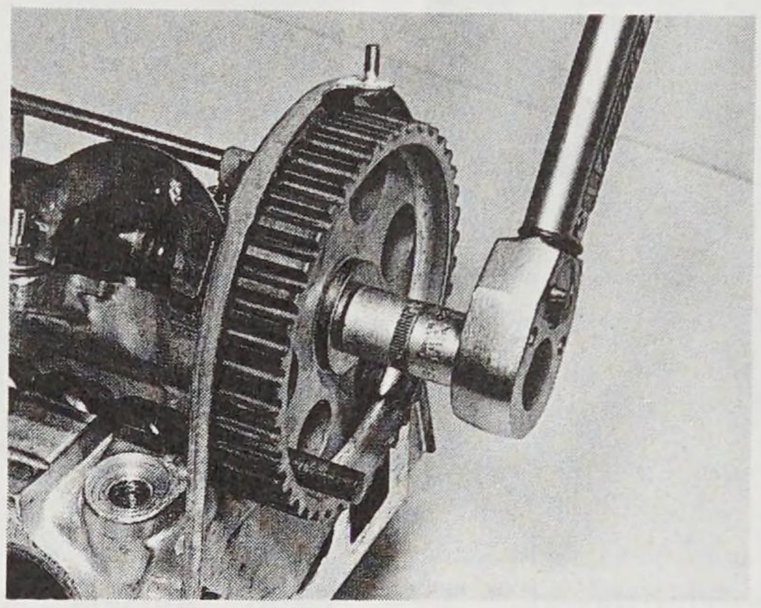
6.26A Fitting the camshaft seal ...



6.26B ... and pressing it home



6.27 Fitting the camshaft drivebelt rear cover



6.28 Tightening the camshaft sprocket bolt

11 Mark the bearing caps 1 to 5 from the camshaft sprocket end using a centre punch.
12 Loosen the bearing caps progressively until all pressure exerted on them by the valve springs is released.
13 Remove the caps and lift off the camshaft.
14 If the distributor housing is to remain in position, the exposed portion of the gasket which seals against number 5 bearing cap must be cut through flush with the cylinder head. Clean all traces of gasket and sealant from the face of the housing. Obtain a new gasket and cut it to size, so that the required portion can be butt jointed in position using sealant, but delay this final operation until number 5 cap is being refitted.
15 Remove the camshaft oil seal from the end of the camshaft.
16 Inspect the camshaft journals in the cylinder head and bearing caps for wear, pitting and scoring. Bearing clearances can be checked using the plasti-gauge method. Plasti-gauge kits are available from motor factors, and contain instructions for use.
17 Similarly, inspect the journals and lobes on the camshaft. Camshaft endfloat can be checked using a dial test gauge.
18 If any of these conditions are evident, it will mean the renewal of the cylinder or camshaft. In the case of the former, consult your dealer. It is sometimes possible to have the bearings reamed and a camshaft with oversize journals fitted.
19 Oil the camshaft bearings in the cylinder head and the bearing caps (photo).
20 Lay the camshaft in position on the bearings (photo). If the distributor housing is still fitted, slide the end of the camshaft carefully through the housing.
21 Temporarily fit the camshaft sprocket and roughly line up the timing marks. If the cylinder head is removed place it on blocks of wood.
22 Fit the bearing caps and tighten the bolts/nuts to the specified torque, working progressively to take up the valve spring pressure evenly (photos). If the distributor housing is still fitted, cut and fit the gasket as described earlier before fitting number 5 bearing cap.
23 Fit the camshaft thrust plate and fit and tighten the Allen bolt securing it to number 1 bearing cap (photos).
24 Fit the oil gallery. Note that later galleries have been modified to improve camshaft lubrication by the fitting of O-ring seals to the plastic locating joints (photos).
25 If it was removed, fit the distributor housing using a new gasket, and tighten its securing bolts. Do not forget the Allen bolt recessed in the housing.
26 Grease the lips of a new camshaft oil seal and fit the seal to number 1 bearing cap. The seal can be pressed home using a socket and long 10.0 mm bolt (photos).
27 Fit the camshaft drivebelt rear cover, lining it up by using the timing dowel before tightening the bolts (photo).
28 Fit the camshaft sprocket and tighten its retaining bolt to the specified torque (photo).
29 Refit the camshaft drivebelt as described in Section 5.
30 The remaining procedure is a reversal of removal.

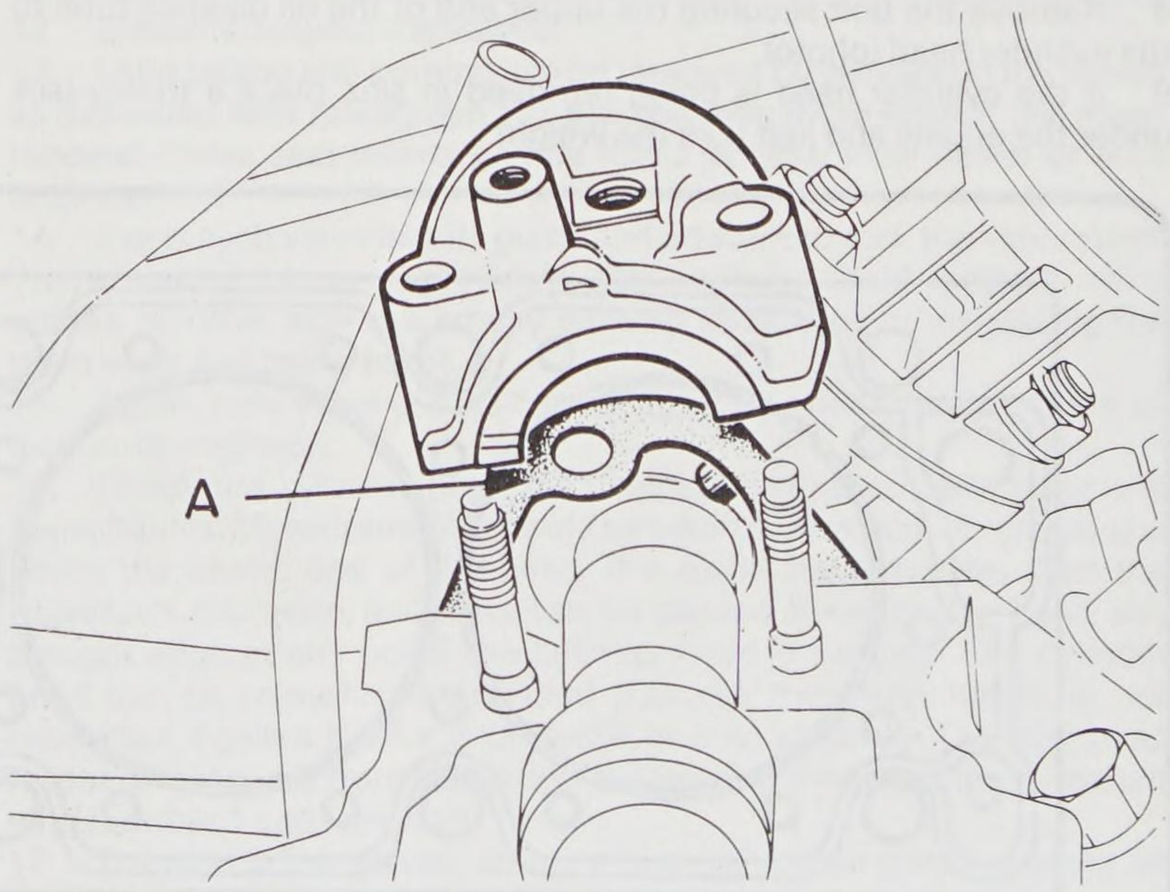
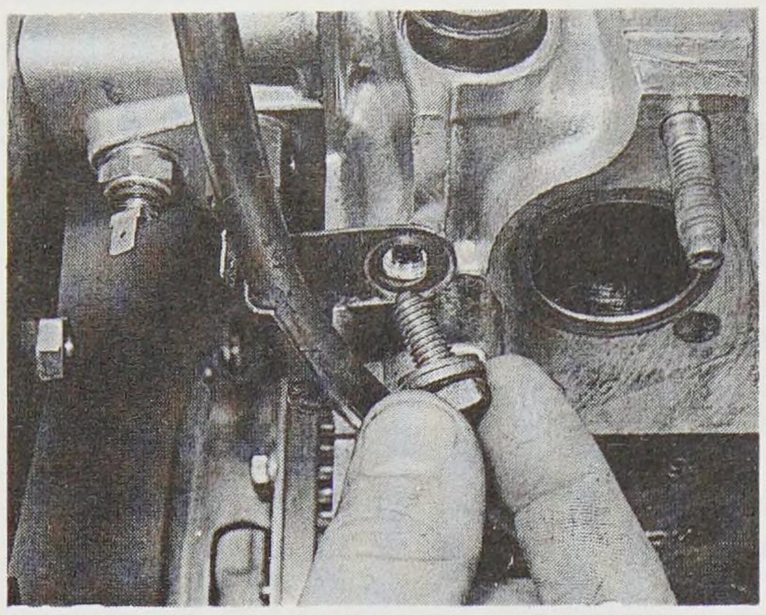
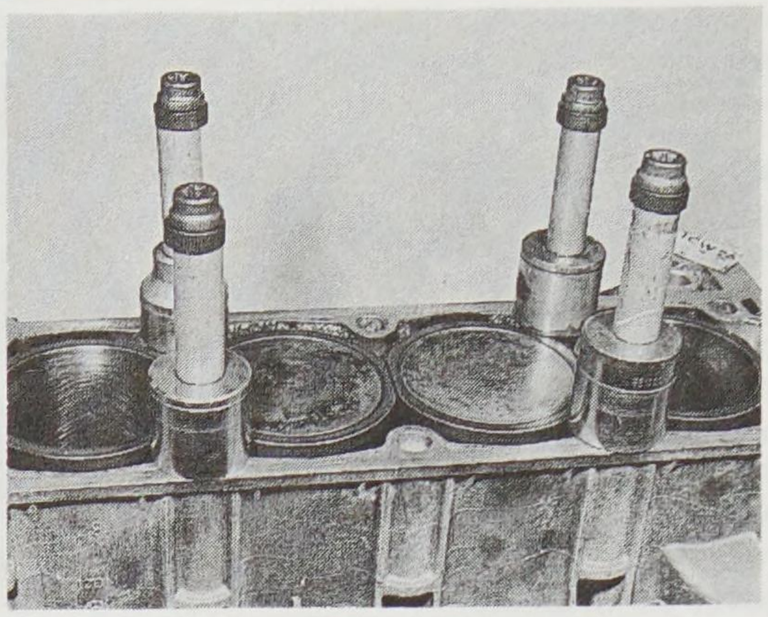


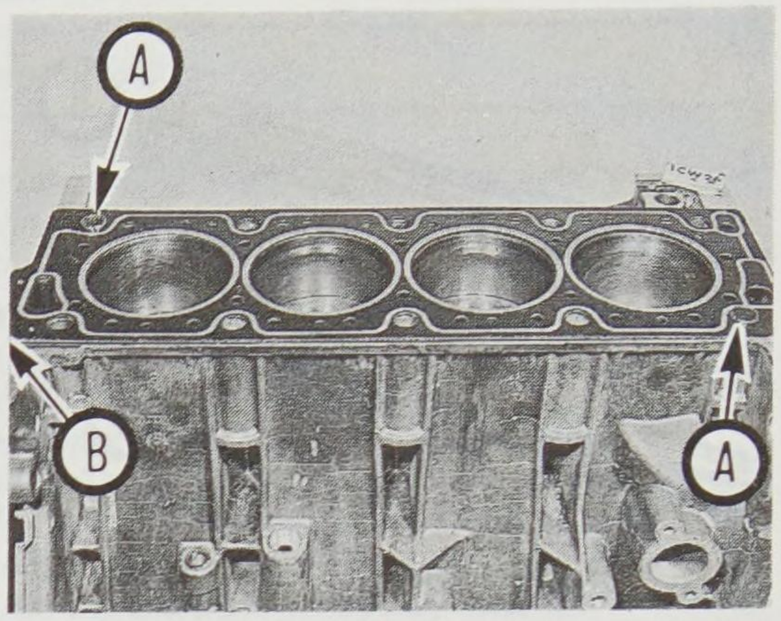
Fig 1.4 Portion of gasket (A) to be butt-jointed on distributor housing (Sec 6)



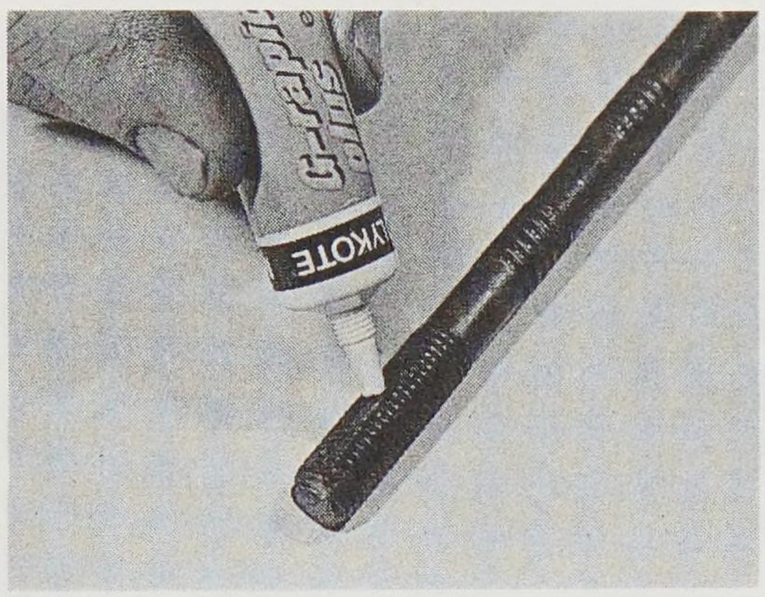
7.8 Removing the oil dipstick tube securing bolt (manifold removed for clarity)



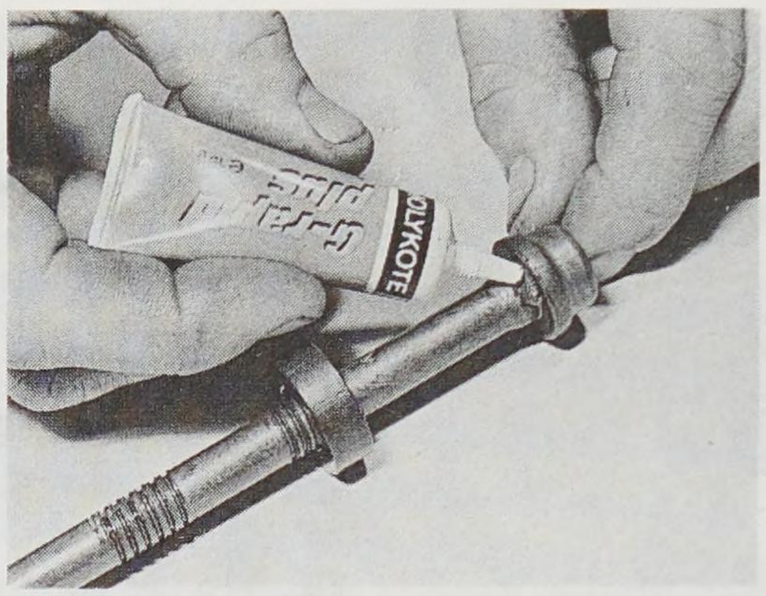
7.19 Home-made cylinder liner clamps



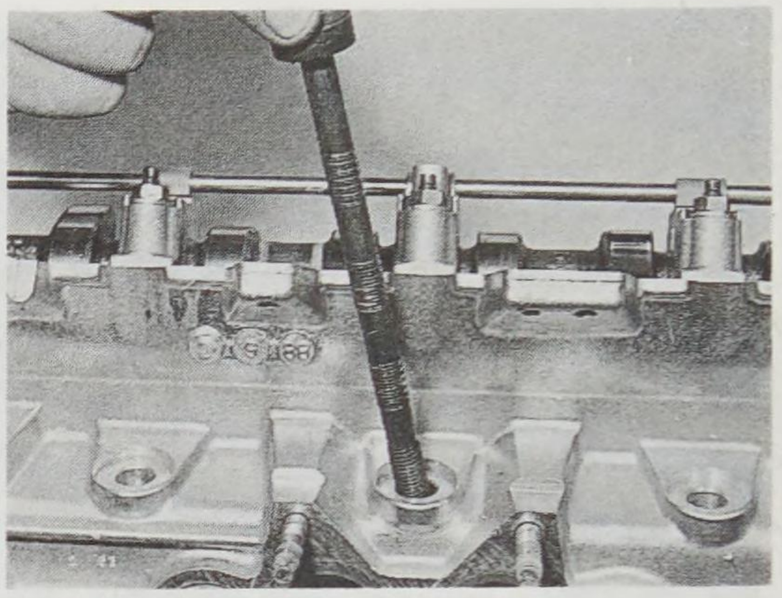
7.23 Cylinder head gasket in position
A Locating dowels B Identification tab



7.25A Applying Molykote to the threads ...



7.25B ... and underside of bolt heads



7.26 Fitting a cylinder head bolt

7 Cylinder head – removal and refitting

Note: *The cylinder head can be removed with the engine in situ. Although the photographic sequence shows the engine removed, both situations are covered in the text.*

1 Remove the camshaft drivebelt as described in Section 5.
2 Drain the cooling system and disconnect the coolant hoses on the thermostat housing.
3 Unbolt and pull back the supplementary air device on fuel injection models.
4 Remove the inlet manifold (Chapter 3).
5 Remove the centre bolt from the engine rear mounting.
6 Disconnect the exhaust downpipe from the exhaust manifold.
7 Taking note of their fitted positions, disconnect any pipes, hoses and electrical leads and harnesses attached to the cylinder head.
8 Remove the bolt securing the upper end of the oil dipstick tube to the cylinder head (photo).
9 If the cylinder head is being removed *in situ,* place a trolley-jack under the engine and just take the weight.
10 Remove the nut securing the right-hand engine mounting to the bearer bracket.
11 Raise the engine on the trolley-jack approximately 75.0 mm (3 in), then remove the two bolts securing the bearer bracket to the cylinder head.
12 Lower the engine back onto the mounting, but remember that the engine will then only be held by one bolt.
13 Remove the camshaft cover as described in Section 4.
14 Remove the fuel pump on carburettor models (Chapter 3).
15 Remove the distributor (Chapter 4).
16 Slacken the cylinder head bolts in reverse sequence to tightening (Fig. 1.6), noting that the bolts are number 55 Torx head type. Remove the bolts.
17 Free the cylinder head from the block by rocking it using two rods inserted part-way into two of the cylinder head bolt holes. Do not lift the cylinder head directly from the block or the cylinder liners may be disturbed which would necessitate engine removal/dismantling to renew the liner seals.
18 Once free, lift the cylinder head off and transfer to the bench. Recover the gasket and locating dowels.

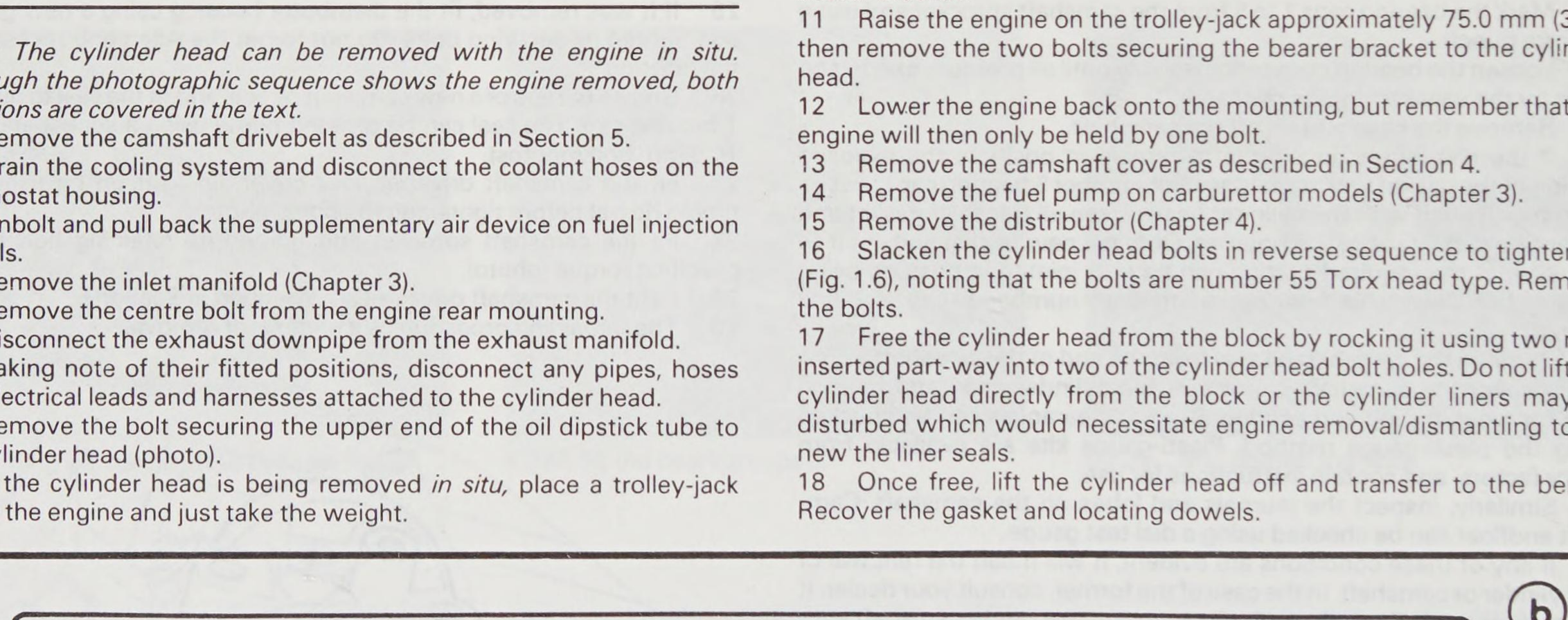


Fig 1.5 Identification tab on cylinder head gasket. 1.4 mm thick gaskets are identified by a notch at (b) and a 4.0 mm hole at (c) (Sec 7)

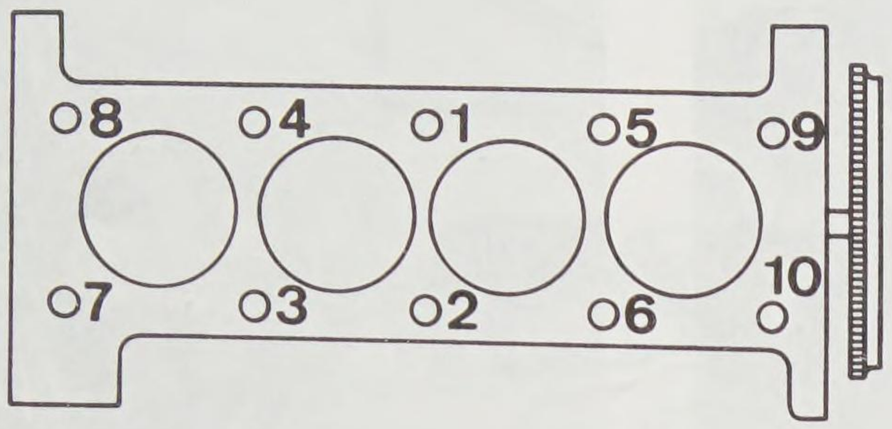


Fig 1.6 Cylinder head bolt tightening sequence (Sec 7)

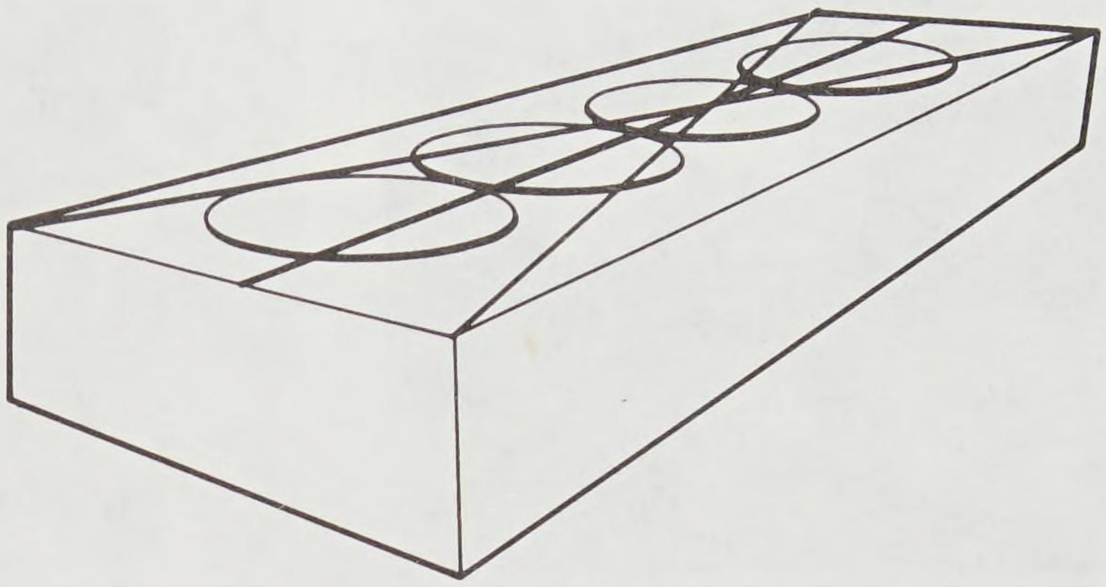
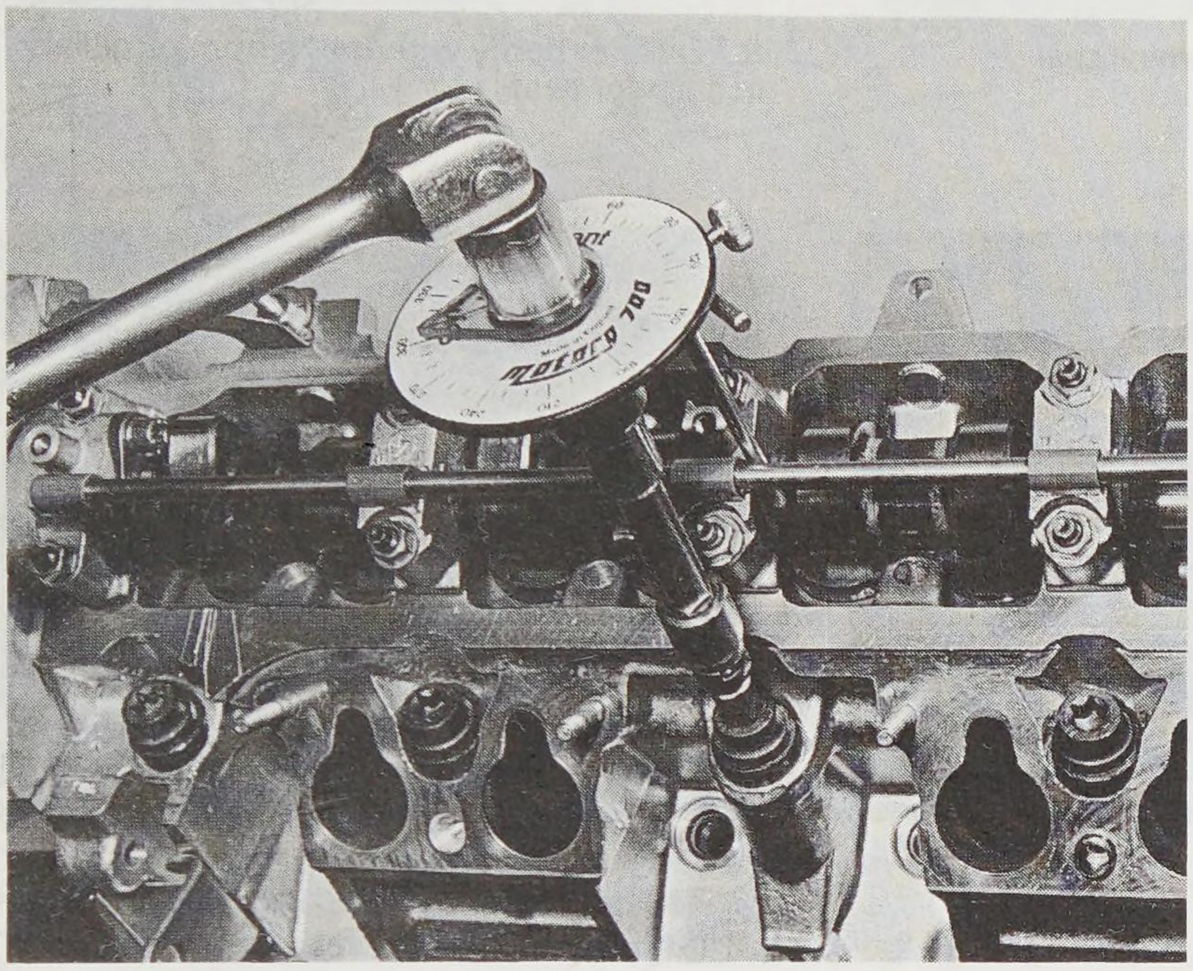


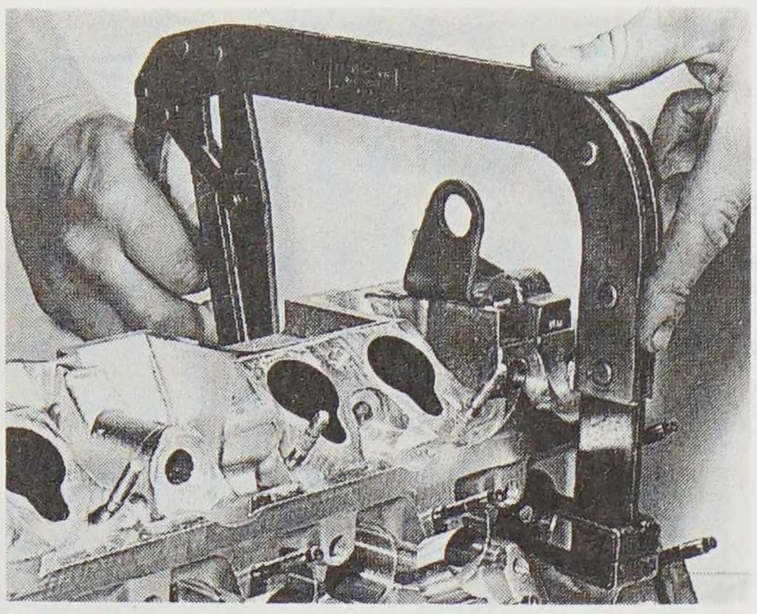
Fig 1.7 Cylinder head measurement across both diagonals and down centre line (Sec 8)


7.29 Using an angle measuring tool

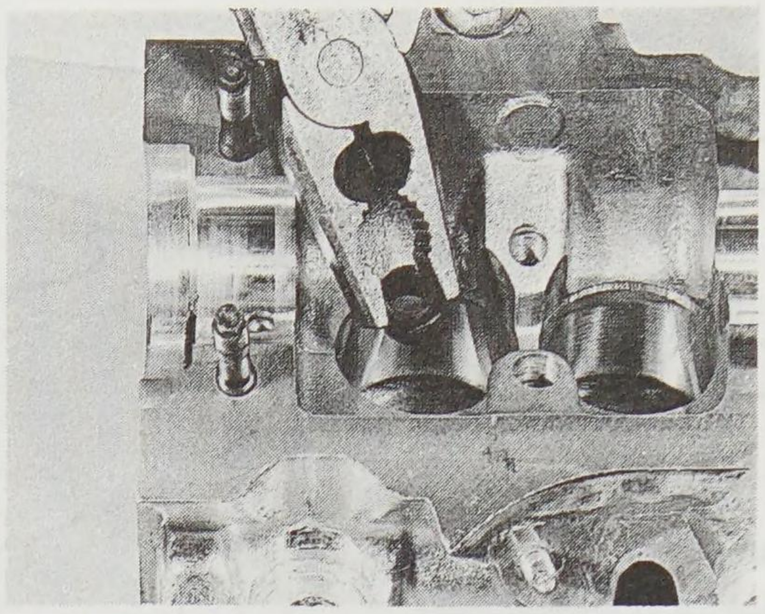
19 Devise a method of preventing the cylinder liners from being disturbed. We used four 32.0 mm sockets, some tubing and four cylinder head bolts (photo). Peugeot market special liner clamps. Do not turn the crankshaft unless clamps are fitted, or the liners may be disturbed.
20 Clean all traces of gasket from the cylinder head and cylinder block using a proprietary gasket removal solvent available from motor factors. Do not use metal scrapers, which can score the soft aluminium head.
21 Clean out the cylinder head bolt holes in the cylinder block using an M11 x 150 tap.
22 Commence refitting by removing the liner clamps.
23 Fit the locating dowels into their holes in the cylinder block and fit a new gasket over the dowels. The gasket is fitted dry (do not use sealant) and is marked 'TOP'. When fitted correctly the identification tab is toward the flywheel end (photo).
Note: *Gaskets are supplied in two thicknesses, 1.24 mm for standard heads and 1.44 mm for heads which have been machined. Ensure the correct thickness of gasket is used. Heads which have been machined by Peugeot have the letter 'R' stamped into the extruded boss on the right-hand end of the engine.*
24 Carefully lower the cylinder head onto the cylinder block, ensuring it fits over the locating dowels.
25 Apply Molycote G rapid plus to the threads of the bolts and to the underside of the bolt heads (photos).
26 Fit the bolts finger tight, noting that the thick spacer is fitted under number 8 bolt (photo).
27 Tighten all bolts in the sequence shown in Fig. 1.6 to the Stage 1 specified torque.
28 Now, bolt by bolt, and using the same sequence, loosen each bolt then retighten to the Stage 2 specified torque plus the angular tightening (Stage 3).
29 The angular tightening is ideally done using a special angular measurement tool (photo). However, a piece of stiff card with the necessary degrees marked on it will suffice.
30 Using this method of tightening, there is no need for subsequent tightening of the bolts after a specified running time.
31 Raise the engine on the jack and refit the right-hand engine mounting bolts. Also fit the nut securing the mounting to the bearer bracket.
32 Remove the jack and fit the bolt to the rear engine mounting.
33 Connect the exhaust downpipe to the exhaust manifold.
34 Fit the camshaft drivebelt, then check and adjust the valve clearances, as described in Sections 5 and 9.
35 The remaining procedure is a reversal of removal.

8 Cylinder head – overhaul

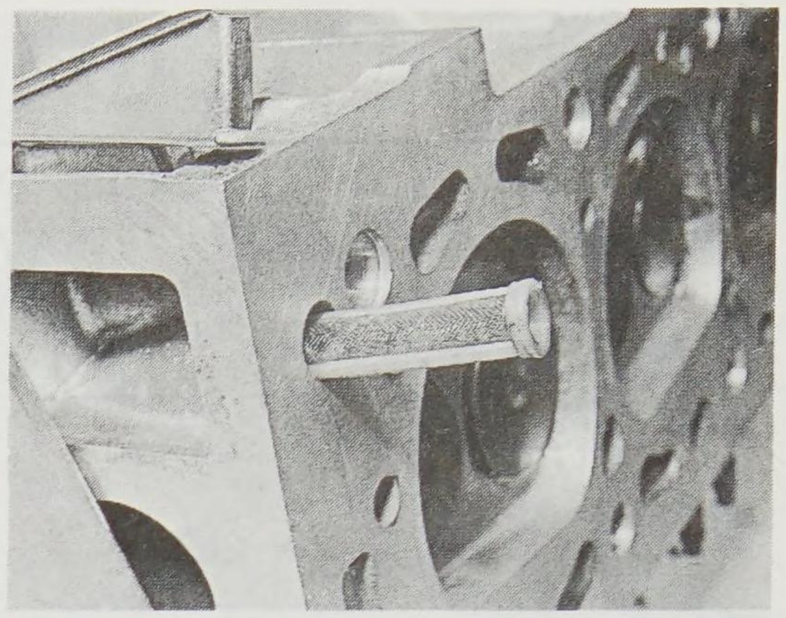
1 Remove the cylinder head (Section 7) and camshaft (Section 6).
2 If not already done remove the distributor housing from the end of the cylinder head.
3 Remove the spark plugs and exhaust manifold.
4 Remove the valve tappets and shims from each valve, keeping them in order. They must be refitted to the valve from which they are removed.
5 Using a valve spring compressor, compress each valve spring in turn, extract the collets, release the compressor and remove the spring retainer, spring, spring seat and valve. Again keep them in order for refitting to the same position from which they are removed (photo).
6 Using pliers, pull off the valve stem seals, but be very careful not to score the tappet bores during the operation (photo).
7 Extract the oil filter from the oil gallery (photo).
8 The cylinder head is now dismantled and can be cleaned using solvent. A proprietary carbon removing spray will make short work of carbon deposits on the valves and in the valve ports.
9 A wire brush and drill can also be used with care, but do not attempt to use a metal scraper, which will score the cylinder head.
10 Once cleaning is completed, wash and dry the head, making sure no traces of carbon are left, especially in the valve guides.
11 Inspect the head for cracking, especially radiating out from the valve seats. The valve seats must be free from burning, cracks and wear.
12 Similarly, inspect the valves.
13 Light pitting and burning can be removed by grinding in the valves as described later (paragraph 17), but anything more serious will mean renewal. Valve seat inserts can be fitted by your local dealer or auto engineer.
14 Insert each valve into its guide and attempt to rock the valve stem. There should be no appreciable play, which would indicate worn guides. Another sign is a smoky exhaust caused by oil bypassing the stem seals and being burnt.
15 Again, new valve guides can be fitted by your Peugeot dealer or local auto engineer.
16 Check the cylinder head for flatness using a straight edge and feeler blades. Measurements should be taken across both diagonals and down the centre line of the head. If a feeler blade greater than the maximum distortion thickness can be passed between the head and straight edge at any point, the cylinder head is warped. The cylinder head can be re-surfaced provided that the minimum height is not exceeded. Again a job for your dealer or auto engineer. Cylinder head height is measured from the face of the head to the top of the camshaft with number 1 cap removed.
17 To grind in the valves, smear a trace of coarse grinding paste on the valve face and, using a suction grinding tool, grind the valve head onto the valve seat using a semi-rotary action, occasionally lifting the valve from the seat. When a dull matt finish is produced on both



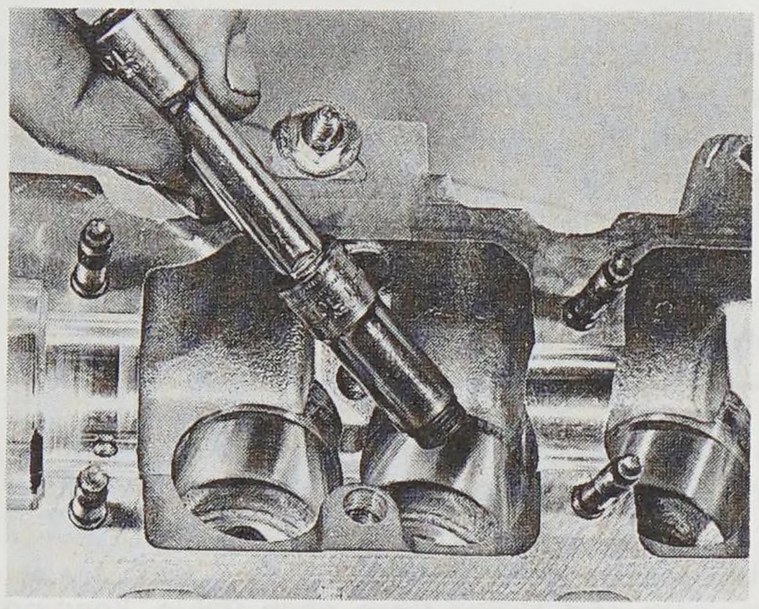
8.5 Using a valve spring compressor



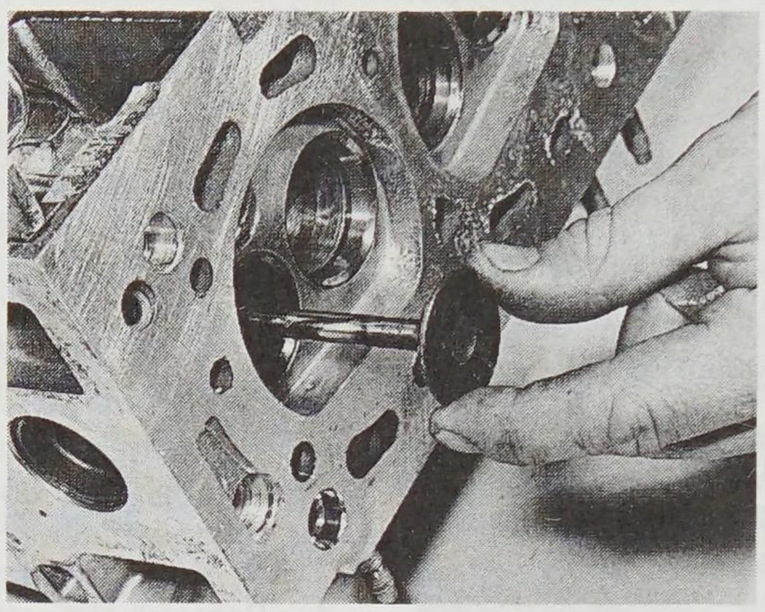
8.6 Pulling off a valve stem oil seal



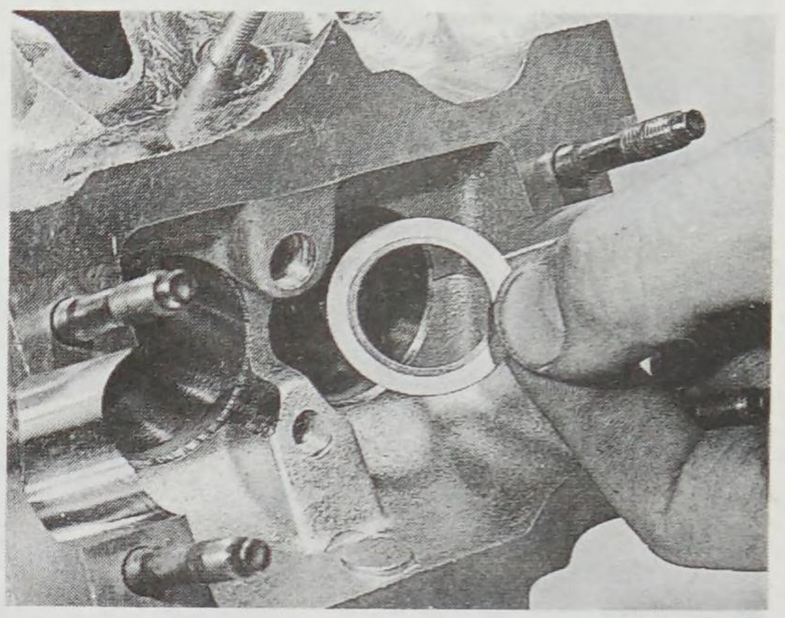
8.7 Oil filter partly withdrawn from oil gallery in cylinder head



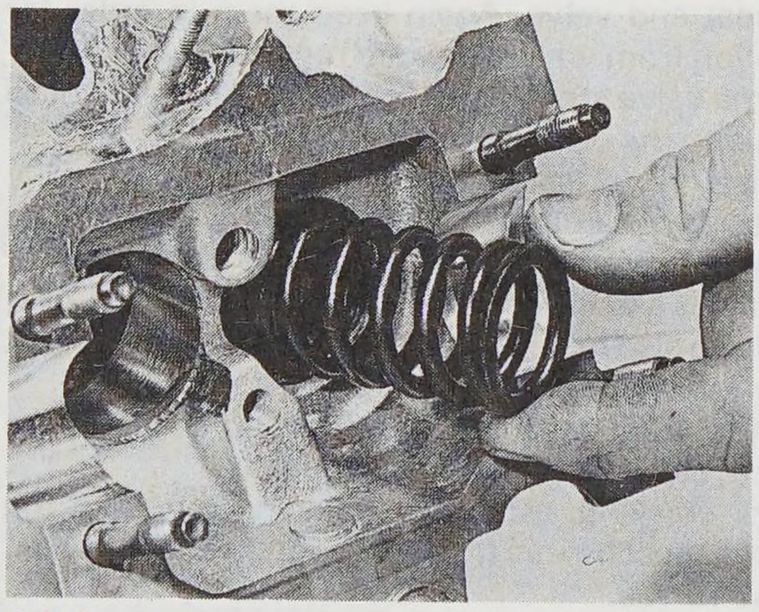
8.20 Fitting a valve stem oil seal



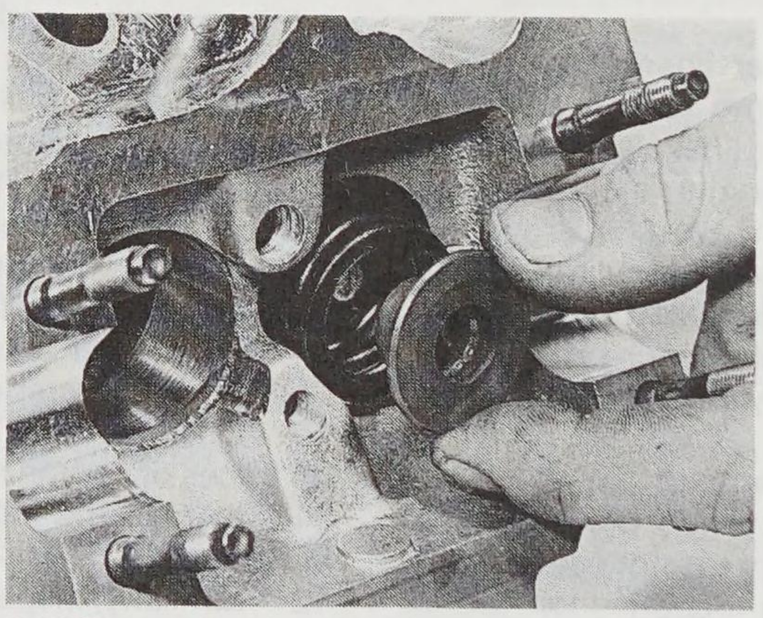
8.21 Fitting a valve



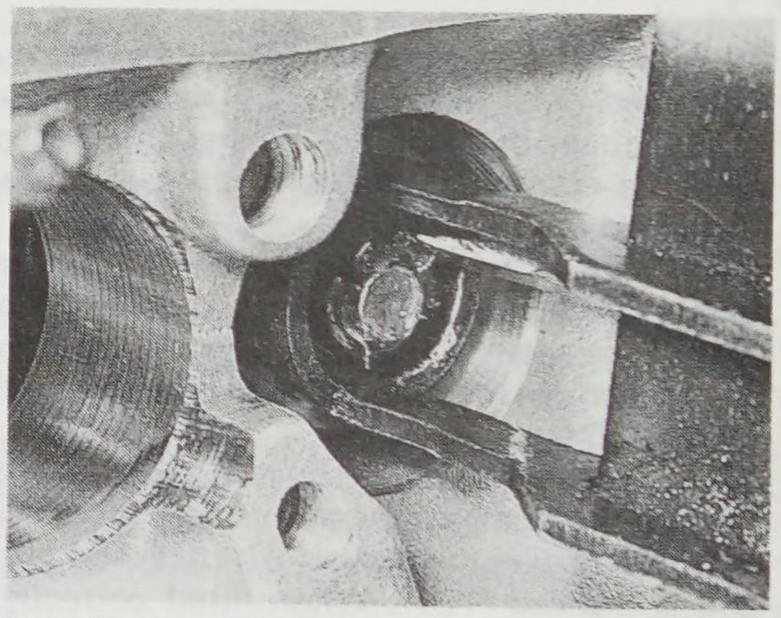
8.22A Fit the valve spring seat ...



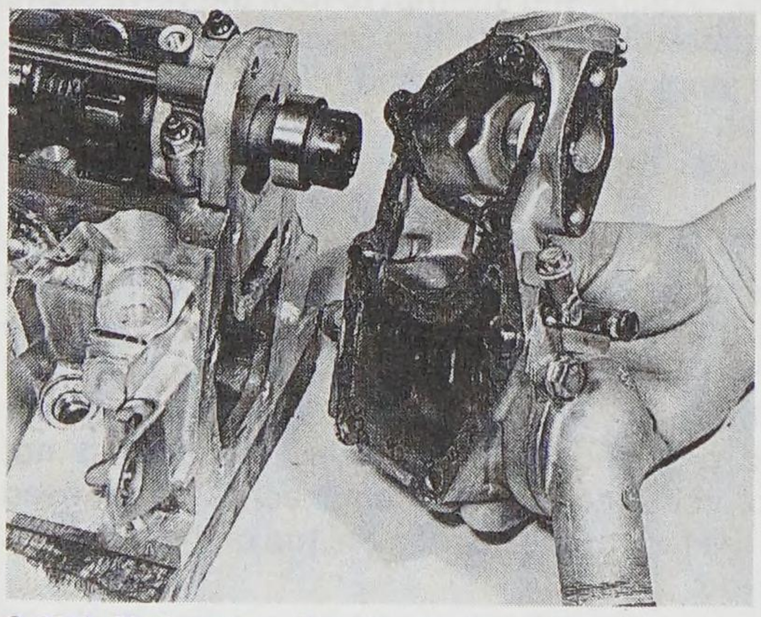
8.22B ... spring ...



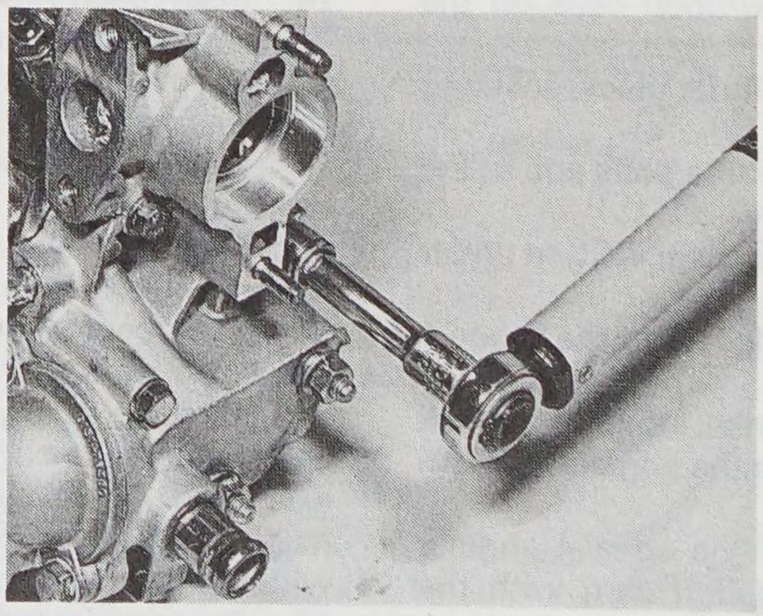
8.22C ... and spring retainer



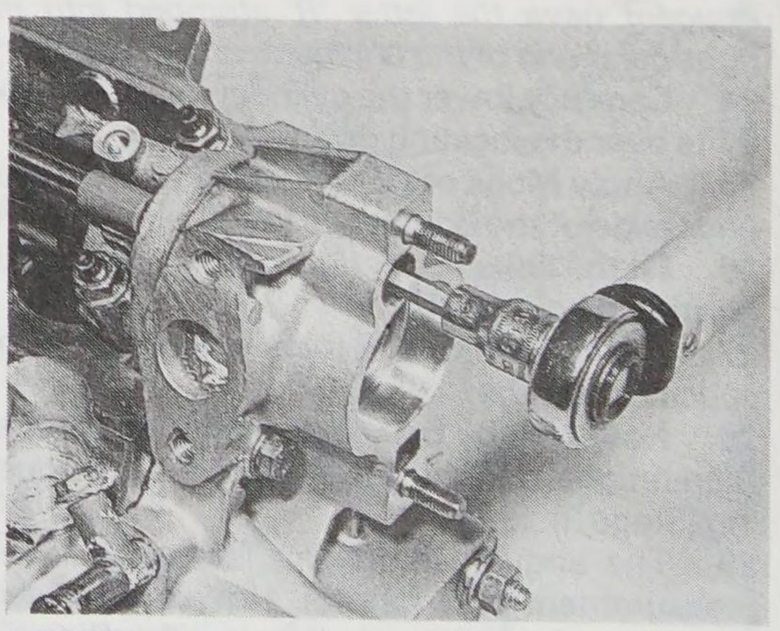
8.23 Fitting valve stem collets



8.27A Fitting the distributor housing ...



8.27B ...and tightening the bolts



8.27C Tightening the recessed Allen bolt

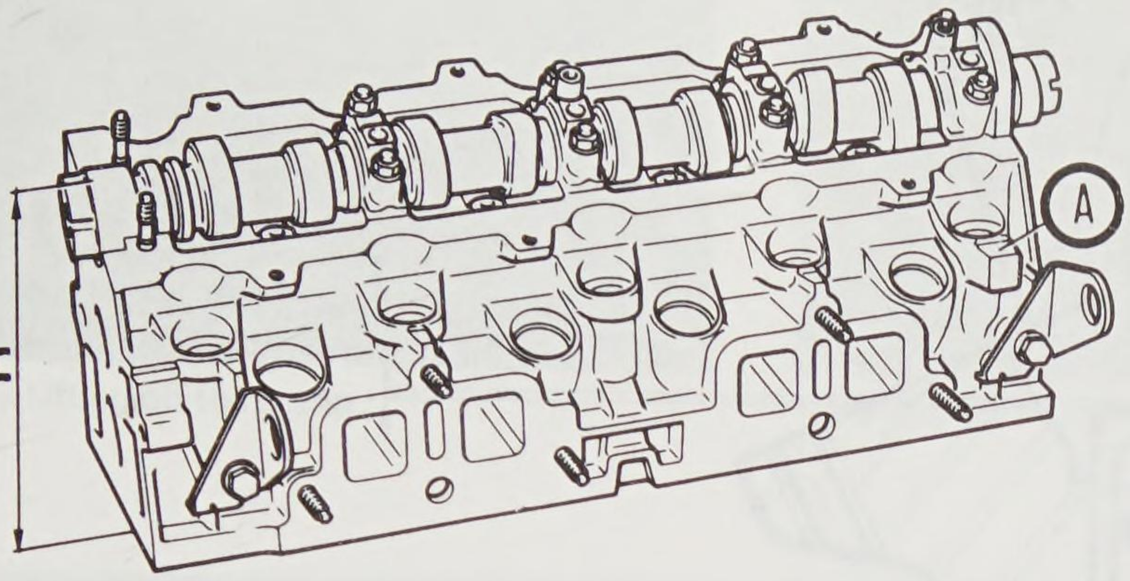


Fig 1.8 Cylinder head height measurement (H). (A) is the extruded boss where machined heads are stamped 'R' (Sec 8)

surfaces evenly, wipe off the paste and repeat the process using fine paste. A light spring placed beneath the valve head will greatly assist this operation. When an even matt ring is produced on the valve and seat the grinding operation is finished.

18 Clean away every trace of grinding paste and, if available, use an air line to blow out the ports and valve guides.

19 Commence reassembly by ensuring everything is scrupulously clean, then oil all components liberally.

20 Insert a valve stem seal into an 11.0 mm socket, then push the seal down over the valve guide (photo).

21 Fit the valve through the valve guide and seal (photo).

22 Fit the valve spring seat, followed by the valve spring and its retainer (photos).

23 Using the valve spring compressor, compress the spring and fit the collets. A little grease will keep them in place until the compressor is released (photo).

24 Remove the compressor and repeat the operation on the remaining valves. Give each valve a light tap with a mallet on the end of the valve stem to seat the components.

25 Before fitting the shims and valve tappets, read Section 9 on checking and adjusting valve clearances.

26 Refit the camshaft as described in Section 6.

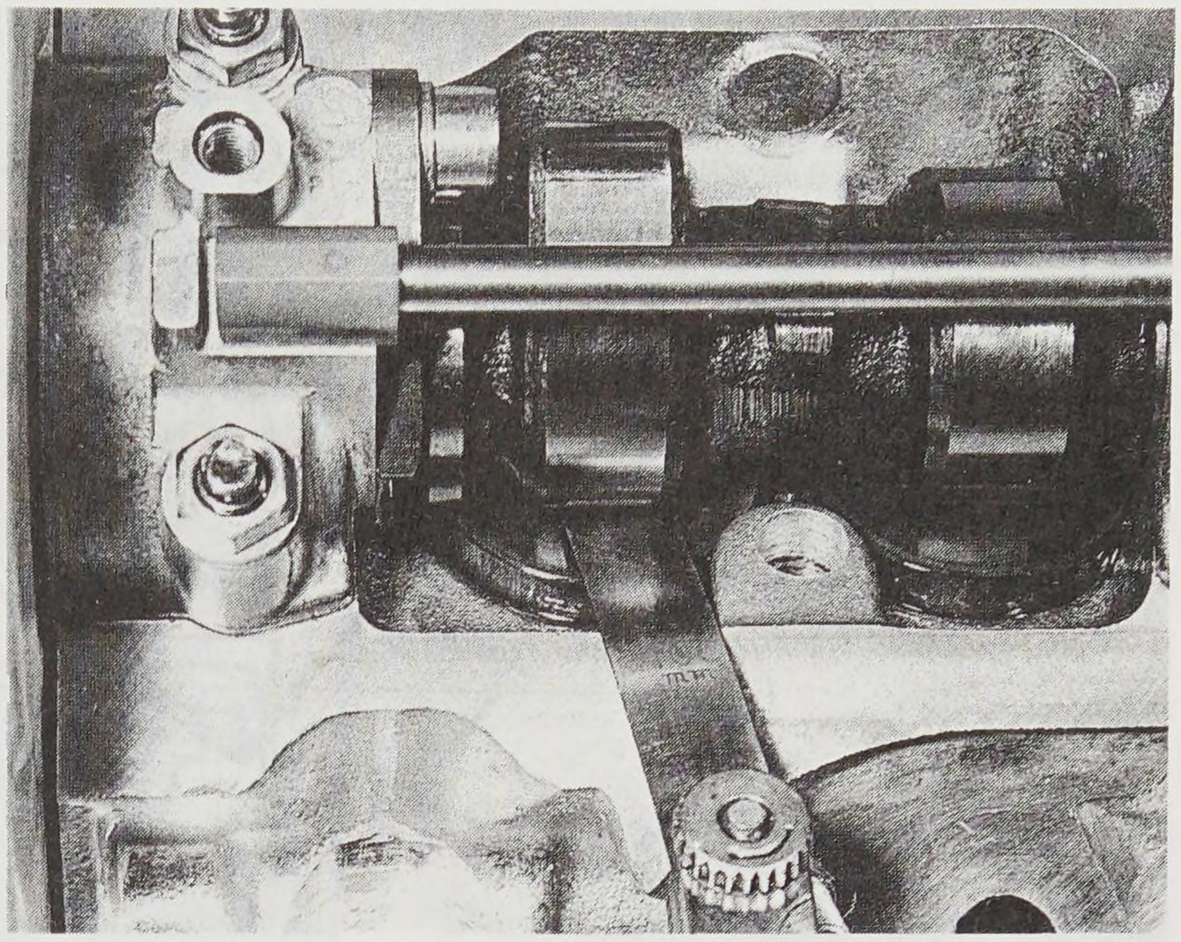
27 Fit a new gasket to the distributor housing, ensure the locating dowels are in position, then fit the housing to the cylinder head. Tighten the bolts, not forgetting the recessed Allen bolt (photos).

28 Fit any support brackets removed during the overhaul.

29 Fit the exhaust manifold and spark plugs.

30 Fit a new oil filter into the oil gallery.

31 The cylinder head is now ready for refitting as described in Section 7.



9.6 Checking valve clearances using a feeler gauge

9 Valve clearances – checking and adjusting

1 The valve clearances must be checked with the engine cold, the engine having been allowed to cool for at least two hours after last being run.

2 Disconnect the battery negative terminal.

3 Remove the camshaft cover as described in Section 4.

4 During the operation, the engine must be turned using a ring spanner or socket on the crankshaft pulley bolt, or (where applicable) by jacking one front wheel, engaging 5th gear and turning the jacked-up road wheel. Turning the engine is made easier by the removal of the spark plugs.

5 Turn the engine until the cam lobe nearest to the camshaft drivebelt end of the engine is pointing vertically upward.

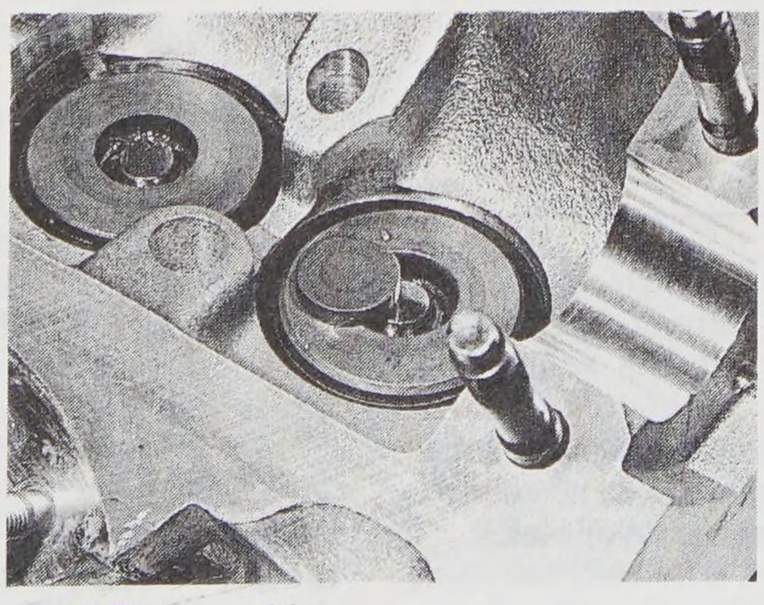
6 Using a feeler gauge, check the clearance between the bottom of the cam and the top surface of the valve tappet (photo).

7 Record the clearance and repeat the operation on the remaining seven valves, ensuring that each cam lobe is pointing vertically upward during the check.

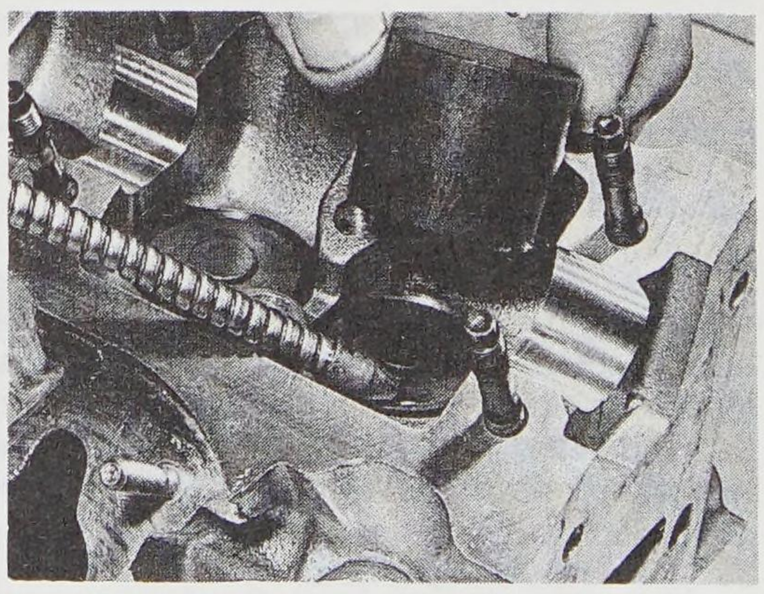
8 On completion, compare the measured clearances with those given in the Specifications, noting that the inlet and exhaust valve clearances are different. To identify the valves, the sequence from either end of the engine is as follows:

Exhaust – inlet – inlet – exhaust – exhaust – inlet – inlet – exhaust

9.12 Measuring a tappet shim



9.15A Fitting a shim ...



9.15B ... and tappet

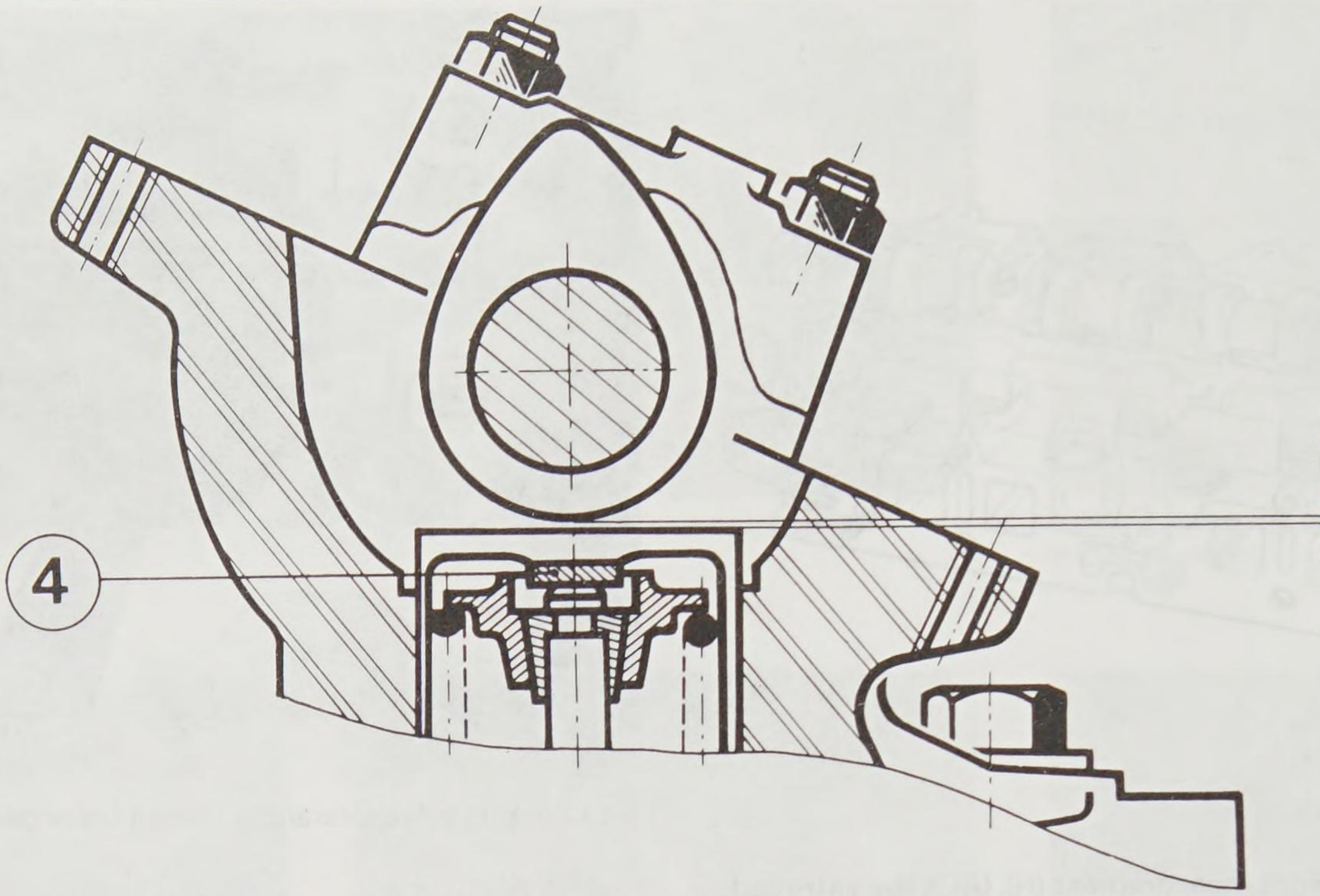


Fig 1.9 Valve clearance is measured at point J and altered by shim (4) (Sec 9)

9 If the clearances on any valve(s) are not as specified, proceed as follows.

10 Remove the camshaft as described in Section 6.

Caution: *With the camshaft drivebelt removed, the crankshaft must not be turned. There is a danger of the valves contacting the pistons with resultant damage*

11 Lift off the valve tappet and shim from the valve with the incorrect clearance.

12 Clean and measure the thickness of the existing shim (photo).

13 Calculate the thickness of the shim required using the following examples.

Too large:

Specified clearance (A) ..... 0.20 mm
Measured clearance (B) ..... 0.28 mm
Difference (B – A) ..... 0.08 mm
Existing shim thickness ..... 2.62 mm
Thickness of shim to be inserted = 2.62 + 0.08 mm = 2.70 mm

Too small:

Specified clearance (A) ..... 0.40 mm
Measured clearance (B) ..... 0.23 mm
Difference (B – A) ..... –0.17 mm
Existing shim thickness ..... 2.86 mm
Thickness of shim to be inserted = 2.86 –0.17 mm = 2.69 mm

14 Shims are available in varying thicknesses from Peugeot dealers.

15 Oil and fit the new shims and the valve tappets (photos).

16 Refit the camshaft and camshaft drivebelt and then re-check the valve clearances. If any clearances are still incorrect, the adjustment process must be repeated.

17 On completion, refit the camshaft cover as described in Section 4.

10 Sump – removal and refitting

1 The sump can be removed with the engine *in situ,* in which case the oil must first be drained and, where fitted, the oil temperature switch disconnected. The procedure which follows is with the engine removed.

2 Unbolt the sump noting the positions of the Allen bolts and that the two shorter bolts are fitted under number 1 bearing at the flywheel end of the engine. If long bolts are fitted here they will cause an oil leak.

3 Lift off the sump (photo).

4 Refit in reverse order using a new gasket, ensuring the Allen bolts are refitting in their correct locations and tightened to the specified torque. A common fault with sump bolts is overtightening which distorts the sump flange leading to oil leaks (photos).

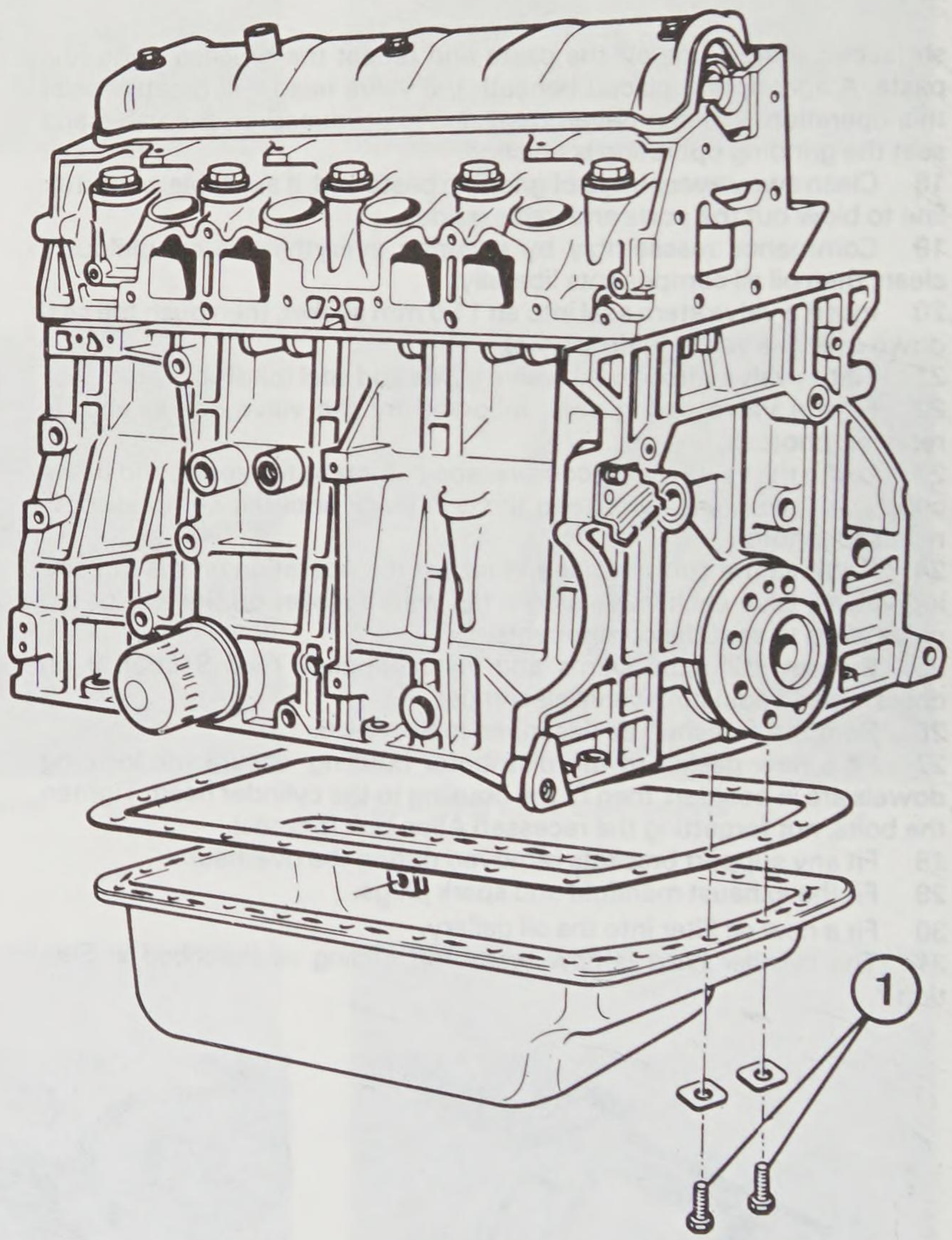
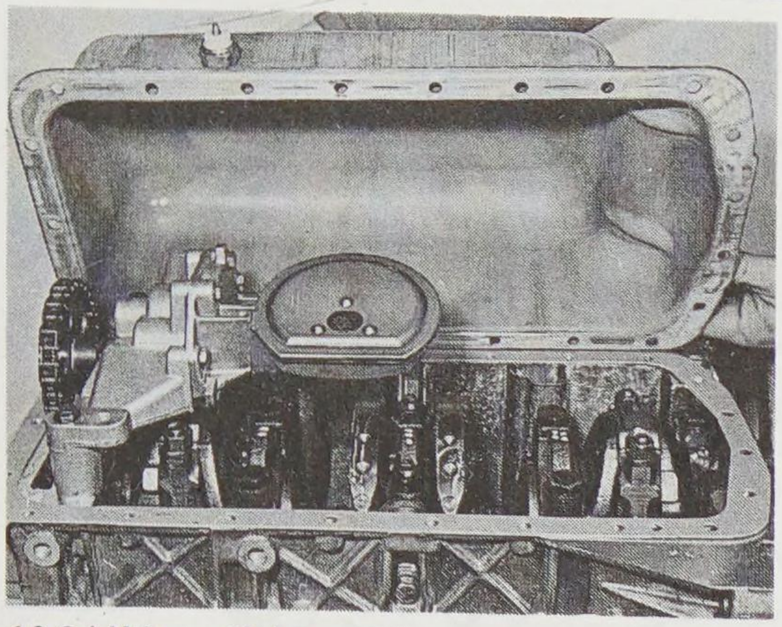
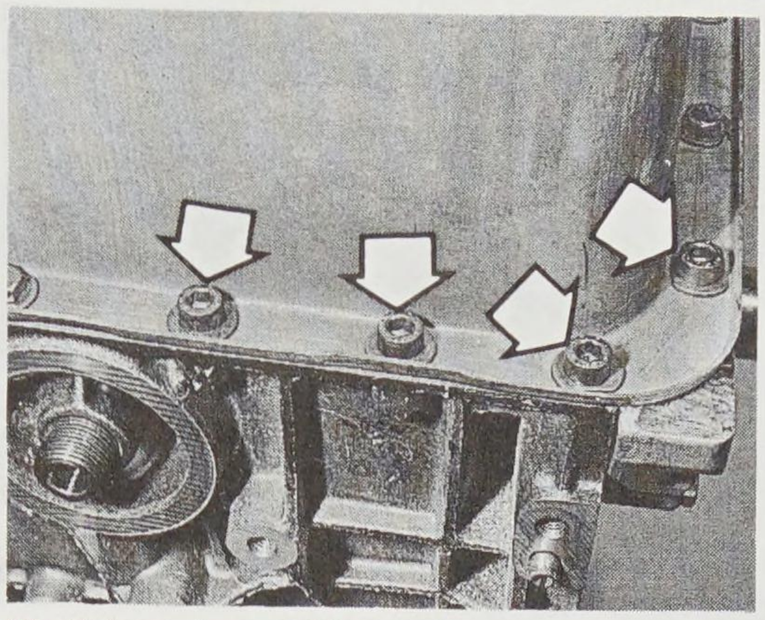


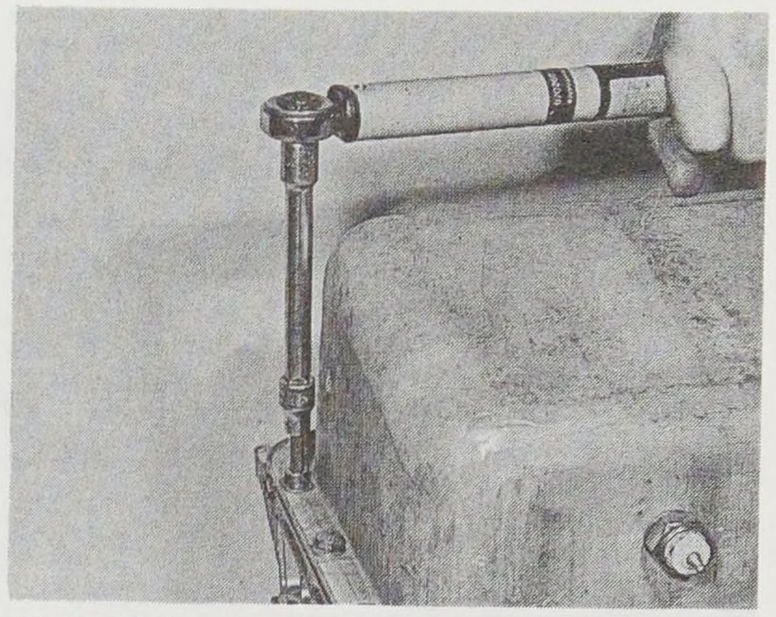
Fig 1.10 Two short bolts are fitted under No 1 bearing at the flywheel end (Sec 10)



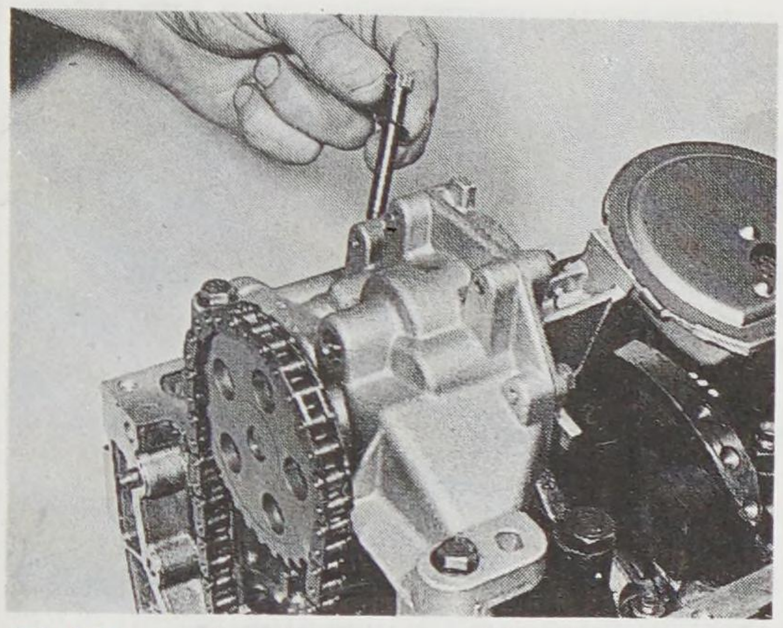
10.3 Lifting off the sump



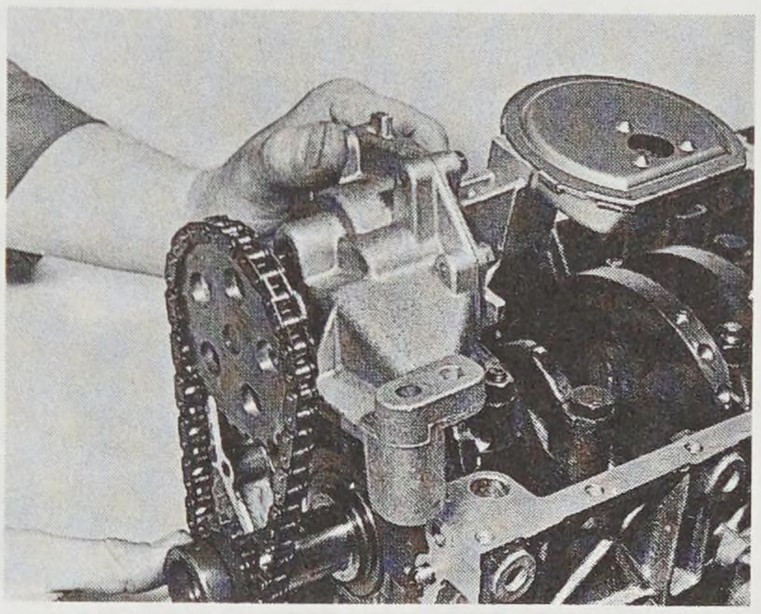
10.4A Location of Allen bolts on sump



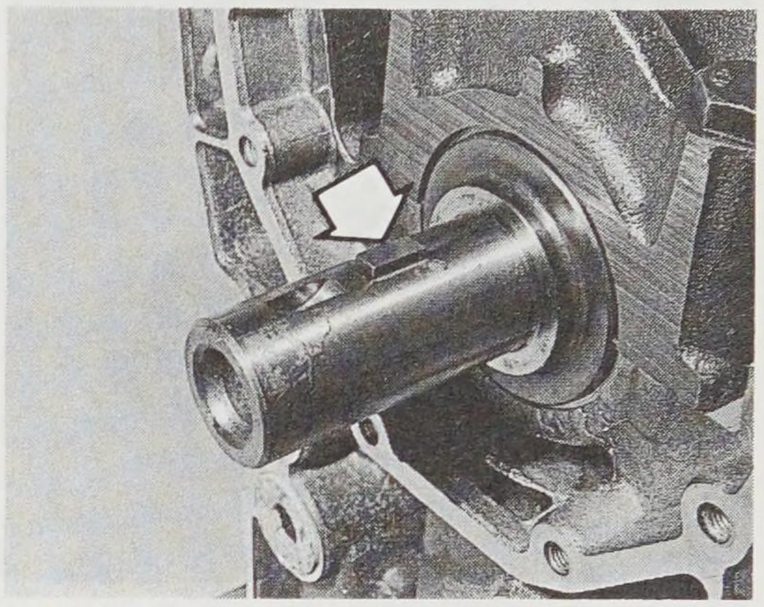
10.4B Tightening the sump bolts



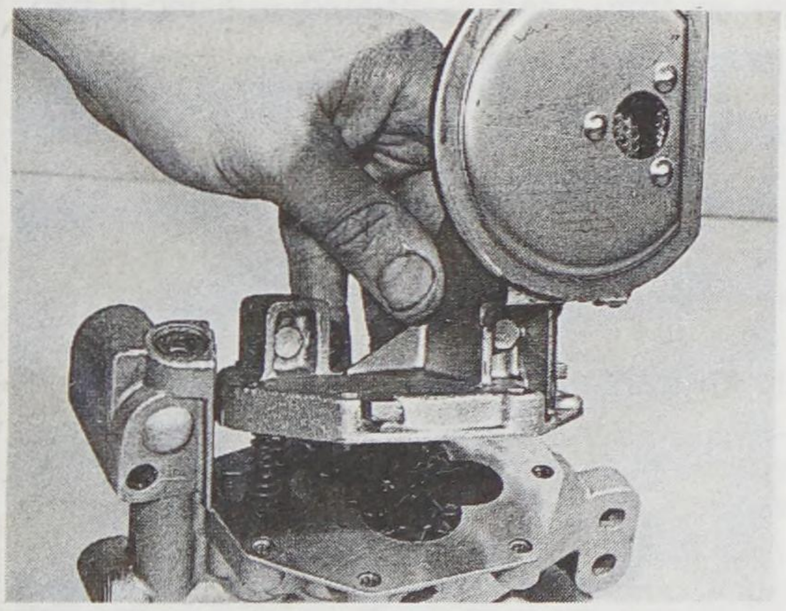
11.4 Removing the rear machined set-bolt from the oil pump



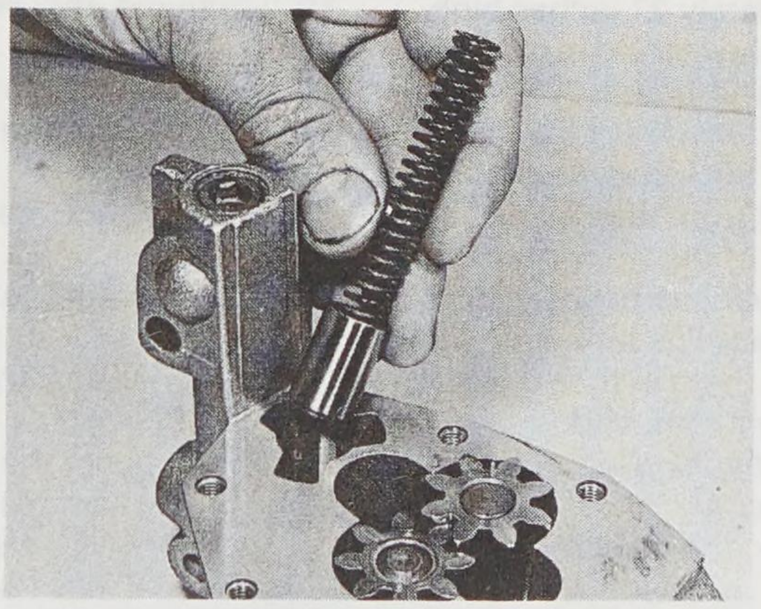
11.5 Sliding off the pump, chain and sprocket



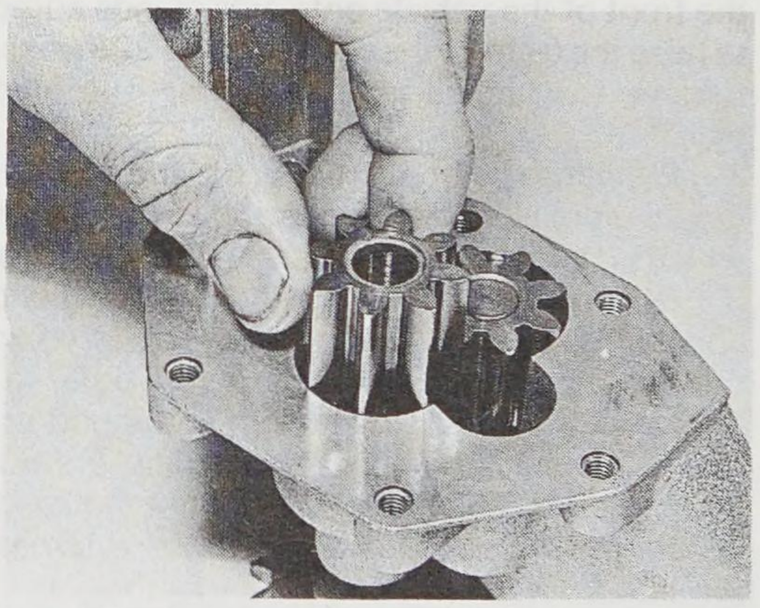
11.6 Woodruff key (arrowed)



11.7A Lifting off the strainer housing ...



11.7B ... and spring and plunger



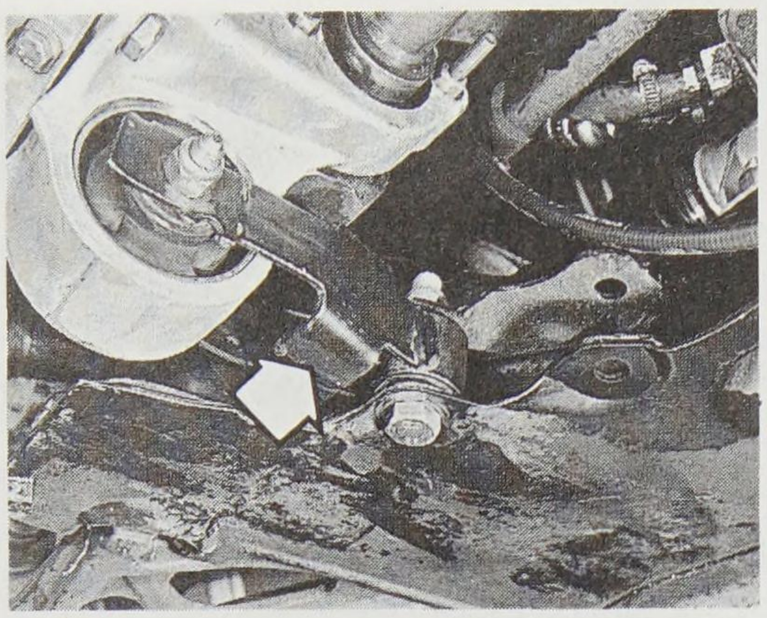
11.8 Lifting out the oil pump gears

11 Oil pump – removal, overhaul and refitting

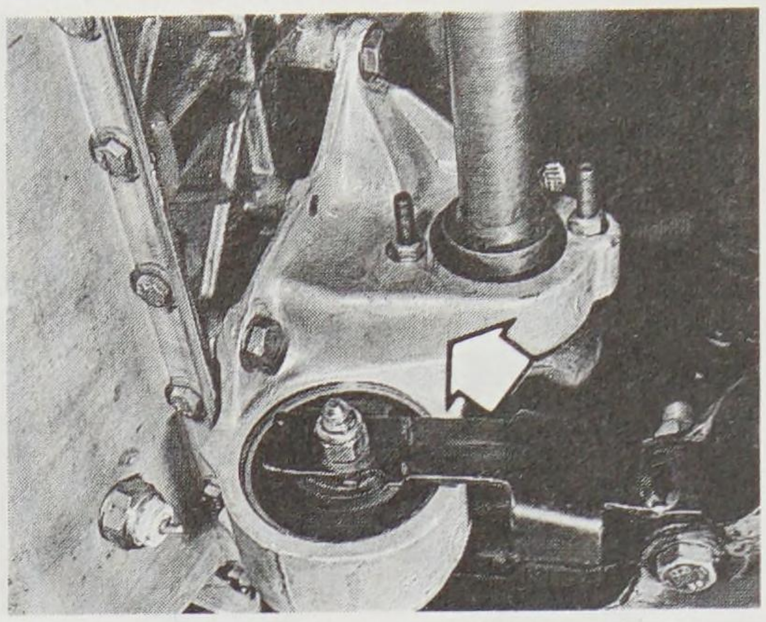
1 Remove the camshaft drivebelt as described in Section 5.
2 Remove the sump as described in Section 10.
3 Unbolt and remove the crankshaft oil seal carrier housing, noting the different length bolts.
4 Unbolt the oil pump from the crankcase. The rear bolt is a machined set-bolt for centralising the pump on refitting (photo).
5 Slide the pump together with the drive sprocket and chain off the crankshaft and crankcase (photo).
6 Retrieve the Woodruff key (photo).
7 Unbolt the strainer housing from the pump and lift it off, being careful of the spring and plunger on the relief valve (photos).
8 Lift out the oil pump gears (photo).
9 No wear limits are published for the pump and if any parts appear excessively worn, or low oil pressure not attributable to other causes has been a problem, the pump should be renewed as a complete unit.
10 Lubricate all parts in clean engine oil before reassembly, which is a reversal of dismantling.
11 Refit the pump in the reverse order of removal. If a new pump is being fitting it is as well to renew the chain and drive sprocket.
12 Refit the sump as described in Section 10 and the camshaft drivebelt as described in Section 5.

12 Engine and transmission unit – removal

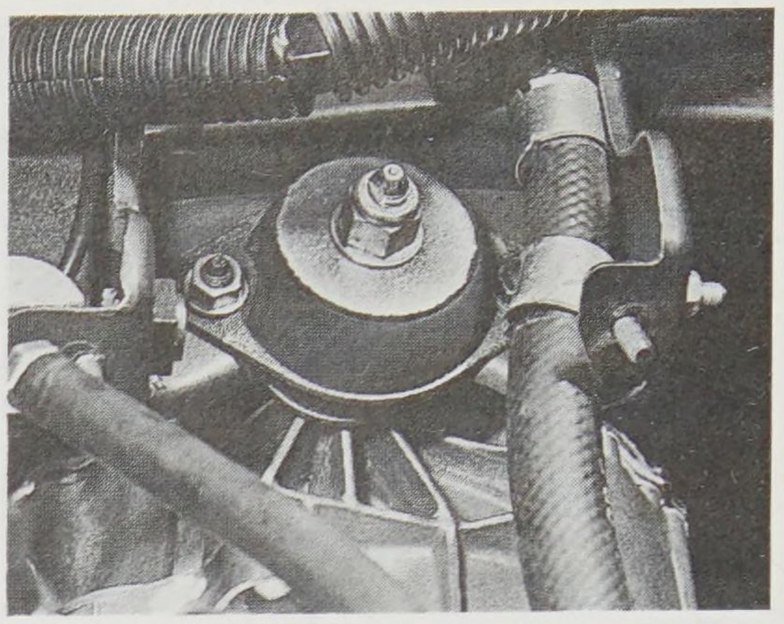
Note: *The following procedure is mainly applicable to manual gearbox models. Information on connections and attachments specific to the automatic transmission installation will be found in Chapter 6, Section 19.*
1 The engine and transmission are removed as one unit. Peugeot state that the unit is lowered from the engine bay, but this assumes that a hydraulic ramp is available. To do this at home would involve raising



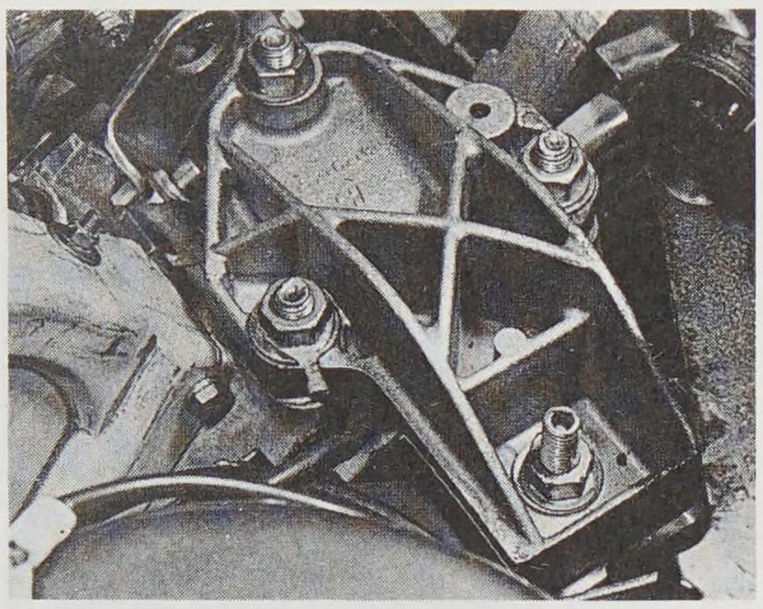
12.13 Engine rear mounting bracket (arrowed)



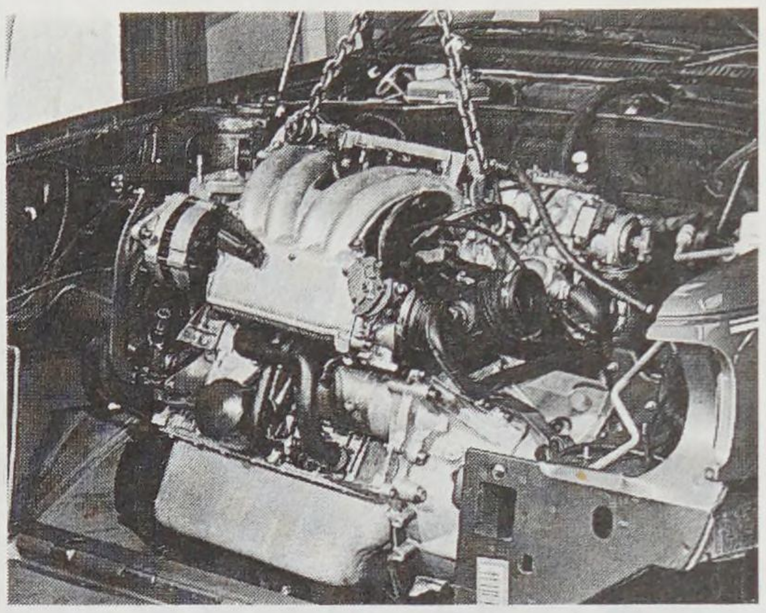
12.15 Right-hand driveshaft intermediate bearing housing (arrowed)



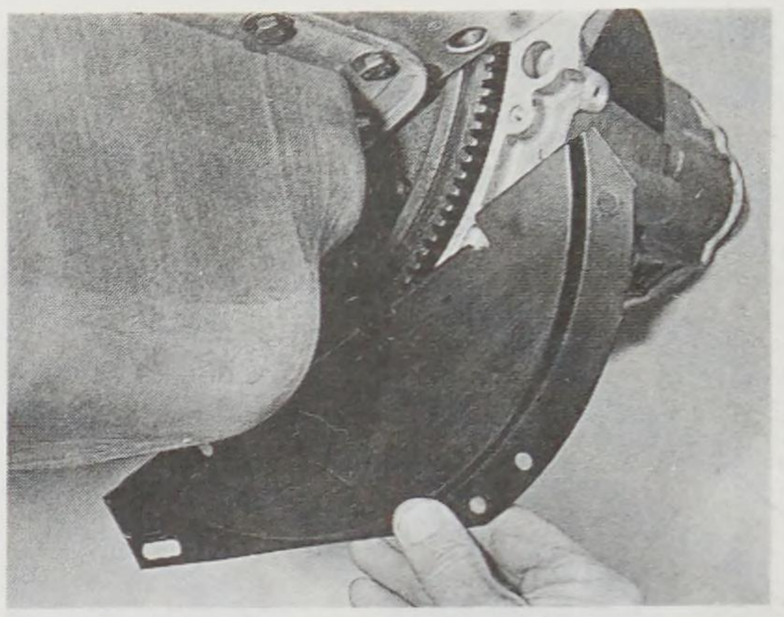
12.33A Left-hand engine mounting ...



12.33B ... and the right-hand mounting



12.35 Raising the engine from the engine bay



12.37 Removing the flywheel cover

the front of the vehicle onto axle stands approximately 21 inches high, to raise the front of the vehicle some 30 inches off the ground in order to remove the engine from underneath (the engine is about 30 inches high).

2 Provided the front cross panel and battery tray are removed there is ample room to lift the engine and transmission unit from the engine bay which is the method described here, and the safer of the two options.

3 During the removal, it is necessary to unclip various hoses, cables and wiring looms . Careful note must be taken of all clips removed and the routing of the hoses and looms in order to refit them in their original positions. Similarly, take note of all support brackets removed.

Note: *On vehicles with air conditioning, the air conditioning system must be de-pressurised by a dealer before the condenser (which is mounted behind the radiator) can be removed. Alternatively, the engine must be lowered from the engine bay.*

4 Remove the battery (Chapter 12).

5 Remove the battery tray (Chapter 11).

6 Remove the anti-roll bar-to-lever suspension arm link rod lower bolts (Chapter 9).

7 Raise the front of the vehicle onto axle stands and remove the front wheels.

8 Remove the engine underfloor protection panels.

9 Drain the engine and transmission oils.

10 Drain the cooling system and remove the radiator (Chapter 2).

11 Remove the front cross panel (Chapter 11).

12 Disconnect the exhaust downpipe from the exhaust manifold.

13 Remove the bracket securing the engine rear mounting to the bodywork (photo).

14 Refer to Chapter 9 and disconnect the lower balljoints from the lower suspension arms.

15 Remove the bolts from the right-hand driveshaft intermediate bearing housing (photo).

16 Pull the hub/suspension units outward to disconnect the inner ends of the driveshafts from the transmission unit. The operation is facilitated by turning the steering from lock-to-lock.

17 Tie the inner ends of the driveshafts up out of the way.

18 On vehicles with air conditioning refer to Chapter 12 and unbolt the compressor from the engine and tie it back out of the way.

19 Remove the air filter assembly and associated trunking (Chapter 3).

20 Disconnect the brake vacuum servo hose from the inlet manifold.

21 Disconnect the heater hoses from the unions on the engine bulkhead.

22 Disconnect the accelerator cable and fuel inlet and return pipes (Chapter 3).

23 Disconnect the reverse release cable and gearchange links (Chapter 6).

24 Disconnect the clutch cable from the clutch release arm (Chapter 5).

25 Disconnect the speedometer cable from the gearbox.

26 Taking careful notes, disconnect the engine wiring looms from the components they serve. Also disconnect the battery positive unit.

27 On fuel injection models remove the bolts securing the relay and fusebox to the right-hand inner wing.

28 Unclip and remove the looms.

29 Disconnect the power steering high pressure hose from the steering rack and drain the hydraulic system as described in Chapter 10. Disconnect the low pressure hose from the pump, then undo the various hose clamps so that the high pressure hose can be removed with the engine and the low pressure hose left in the engine bay.

30 Disconnect the engine earth leads.

31 Attach suitable lifting gear to the engine using the two engine lifting eyes.

32 Raise the hoist and just begin to take the weight of the engine.

33 Remove the left and right-hand engine mountings (photos).

Note: *If the right-hand engine mounting hydro-elastic unit is to be renewed because of wear/perishing, a special tool is needed to unscrew it from the wing panel, and for refitting and tightening to the specified torque.*

34 Make a final check round the engine to ensure that all hoses, leads and cables have been disconnected.

35 Slowly raise the engine from the engine bay, checking frequently that there are no obstructions (photo).

36 Once clear, swing the unit clear of the vehicle and lower it to the ground.

37 Unbolt the flywheel cover (photo).

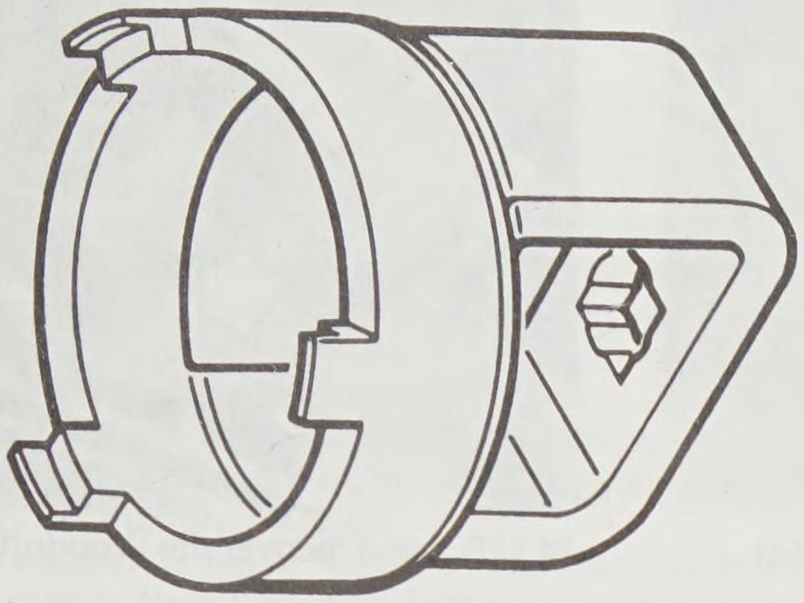
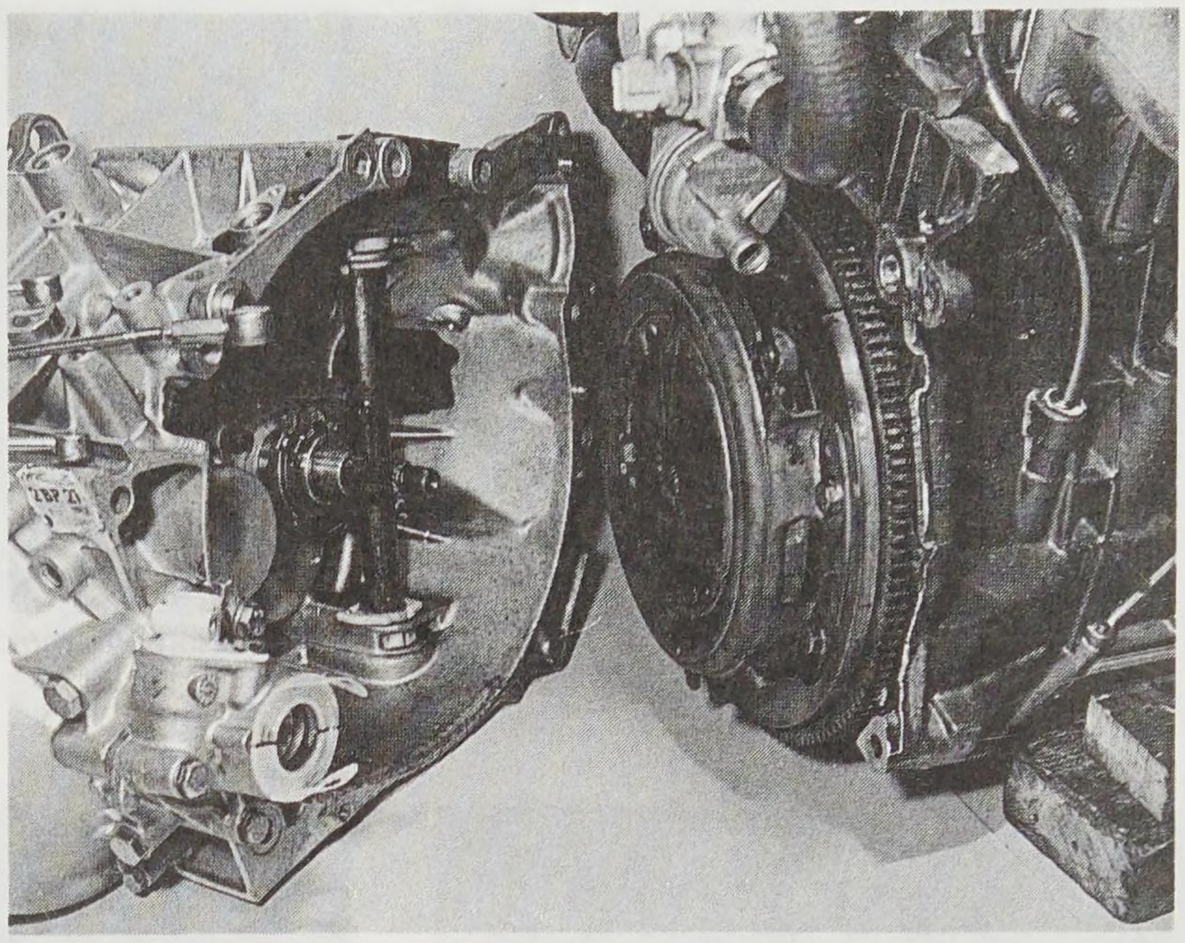


Fig 1.11 Special tool for removing and refitting the right-hand engine mounting hydro-elastic unit (Sec 12)

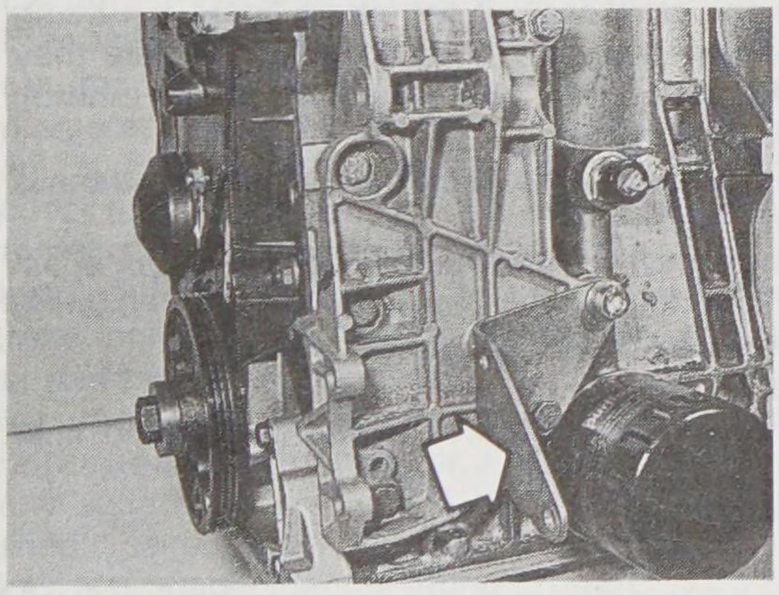
38 Remove the starter motor, then remove the remaining transmission-to-engine bolts, noting any brackets and removing the TDC sensor at the same time.
39 Pull the transmission unit from the engine, being careful not to allow any weight to hang on the input shaft (photo).
40 Transfer the engine to the bench and support it on blocks of wood.

13 Engine dismantling – general

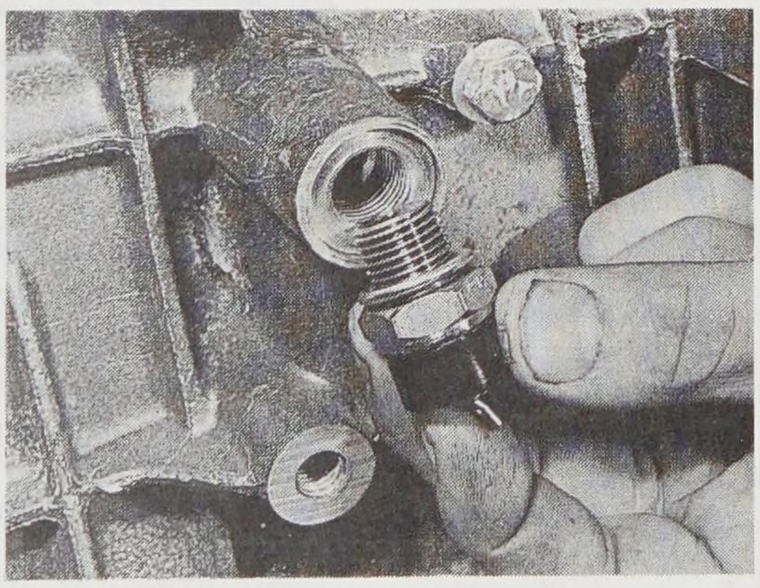
1 As each component is removed, clean it in a bath of paraffin, but do not immerse parts with oilways in the paraffin. Oilways are best cleaned out using compressed air, but if this is not available a footpump may suffice. If the oilways are blocked, probe them carefully with wire.
2 Always obtain and fit new gaskets. To use old gaskets is false economy, even if they can be removed in one piece. Keep the old gaskets until overhaul is completed, as they may come in handy as a template if a new gasket is not immediately available and a temporary substitute has to be cut.
3 Take careful notes as dismantling proceeds of where and how components are fitted, especially the location of support brackets, hose and wiring loom clips, and the routing of these components. Wherever possible, refit nuts and bolts from where they are removed as a means of keeping them in order.
4 Many components (valves, pistons etc) must be refitted in the same position from where they are removed. These components must be kept together and carefully marked or labelled.



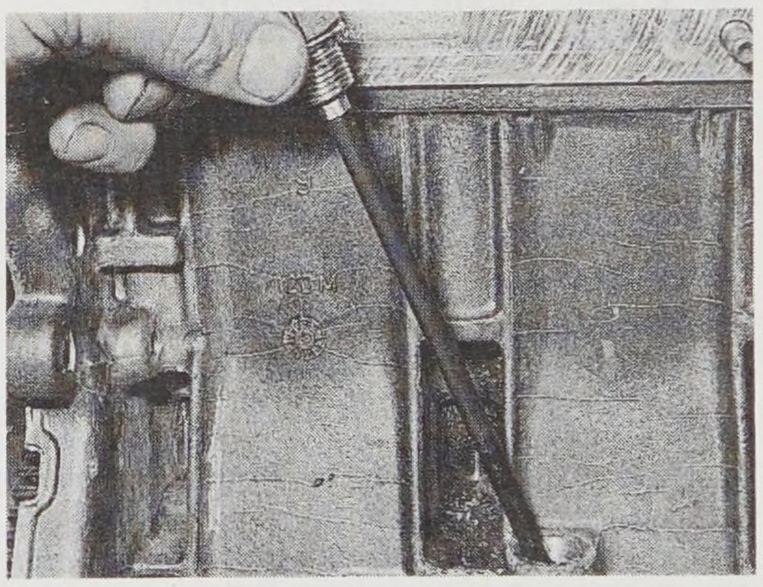
12.39 Separating the transmission from the engine



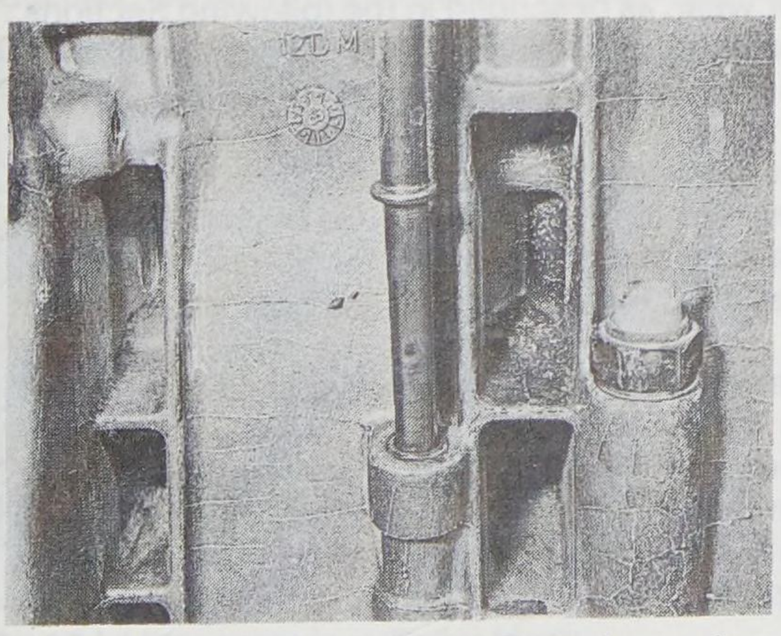
14.2 Alternator mounting plate (arrowed)



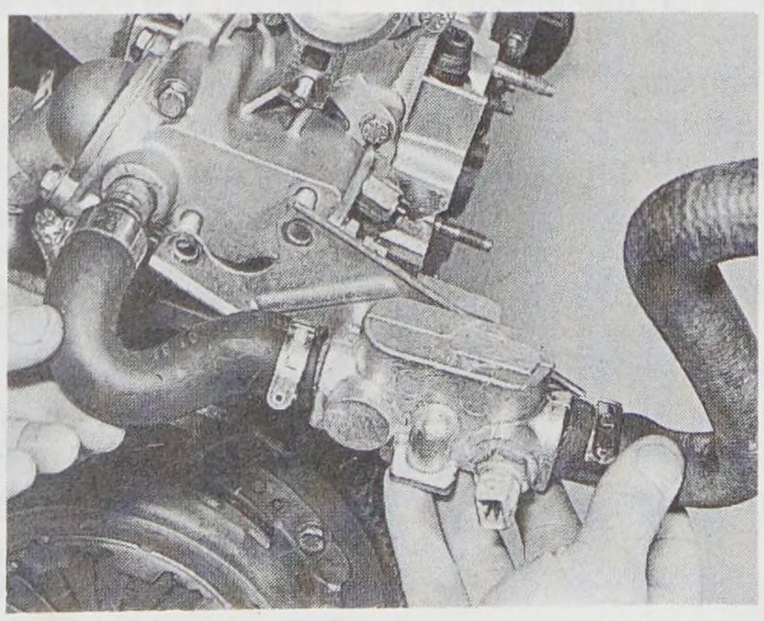
14.4 Removing the oil pressure transmitter



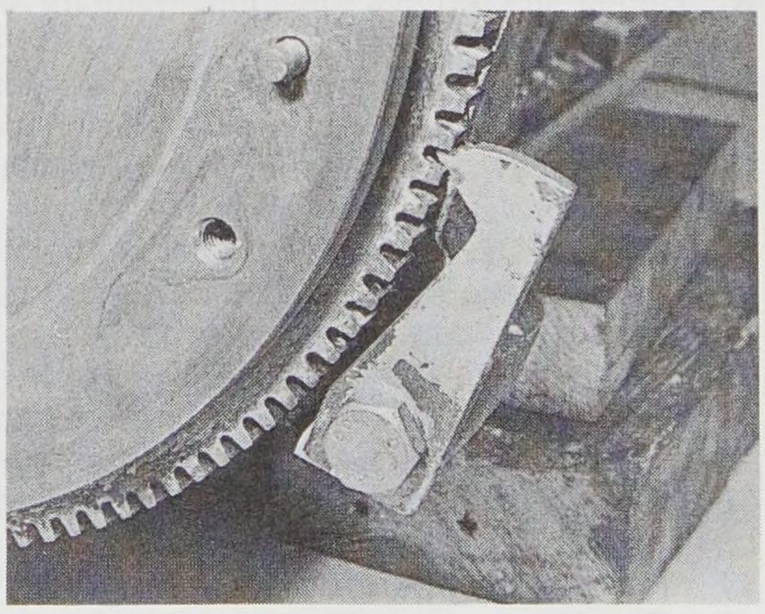
14.5 Removing the oil level sender



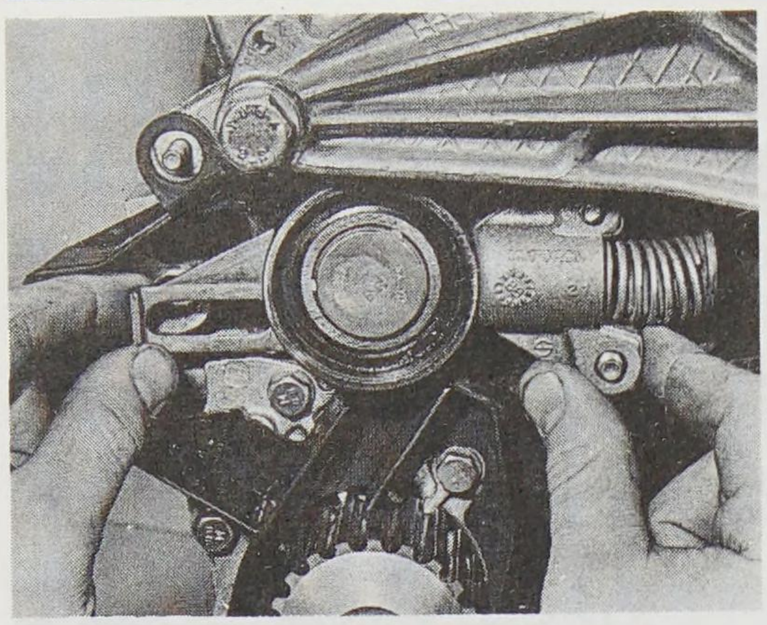
14.6 Pulling the dipstick tube from the engine



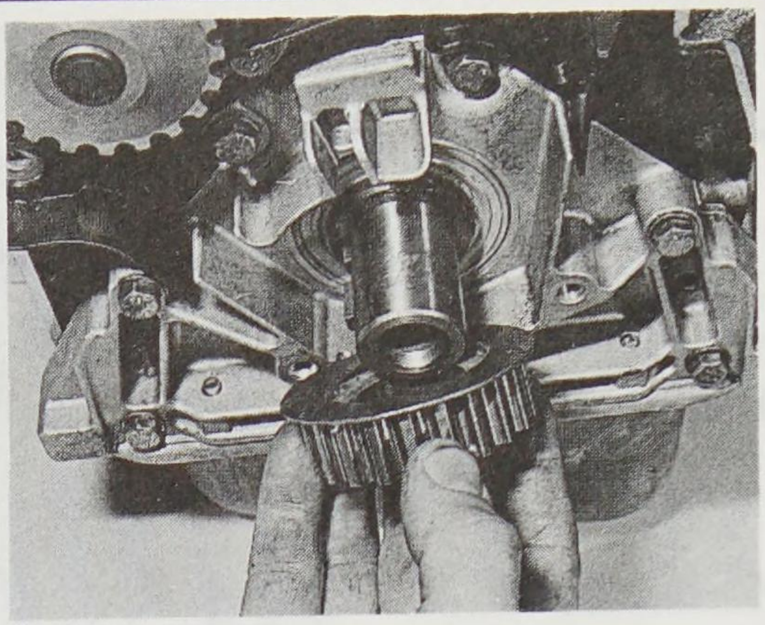
14.8 Removing the supplementary air device on fuel injection engines



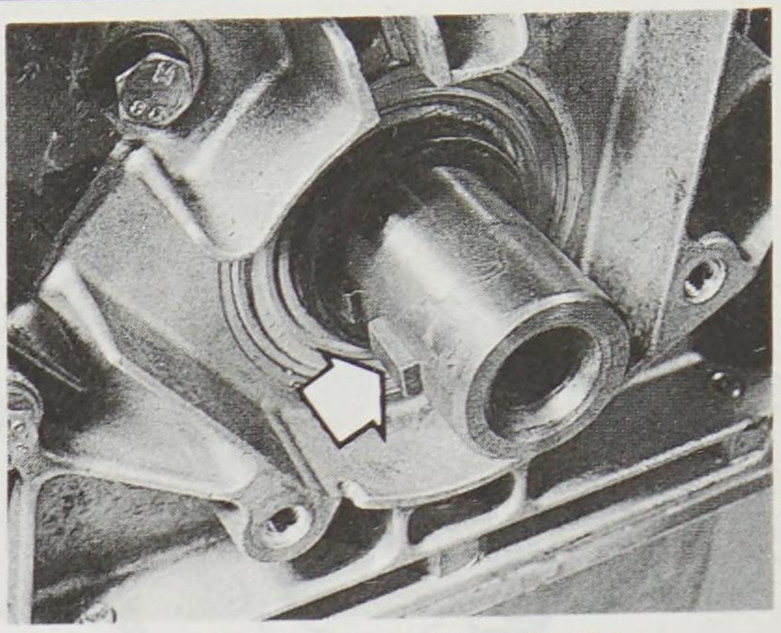
14.10 One method of jamming the flywheel



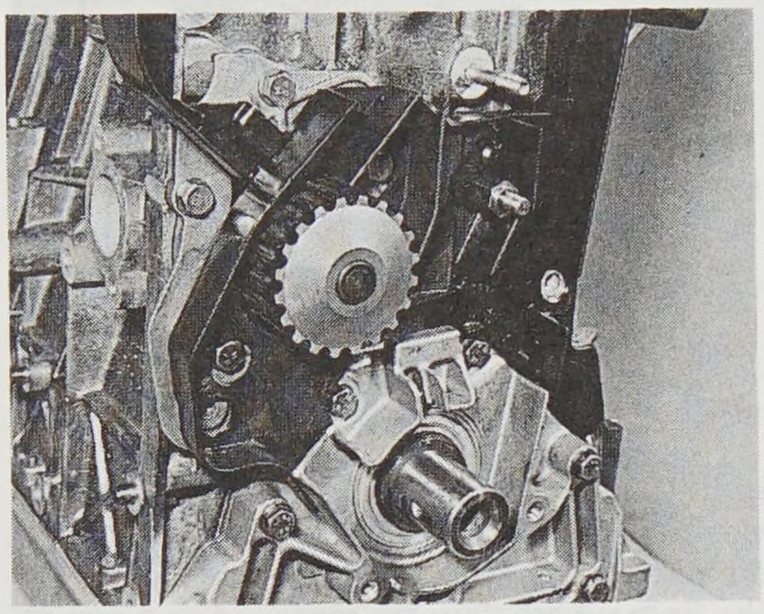
14.11 Removing the camshaft drivebelt tensioner



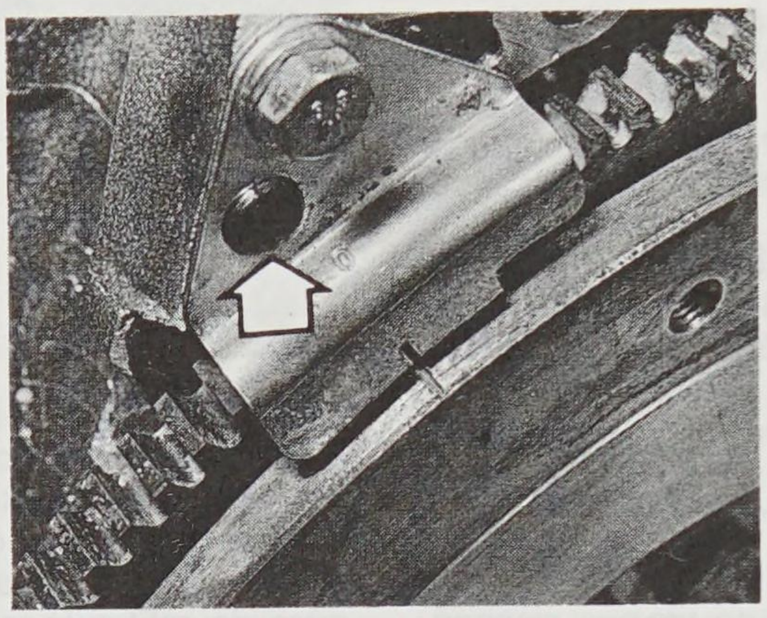
14.12A Remove the crankshaft sprocket ...



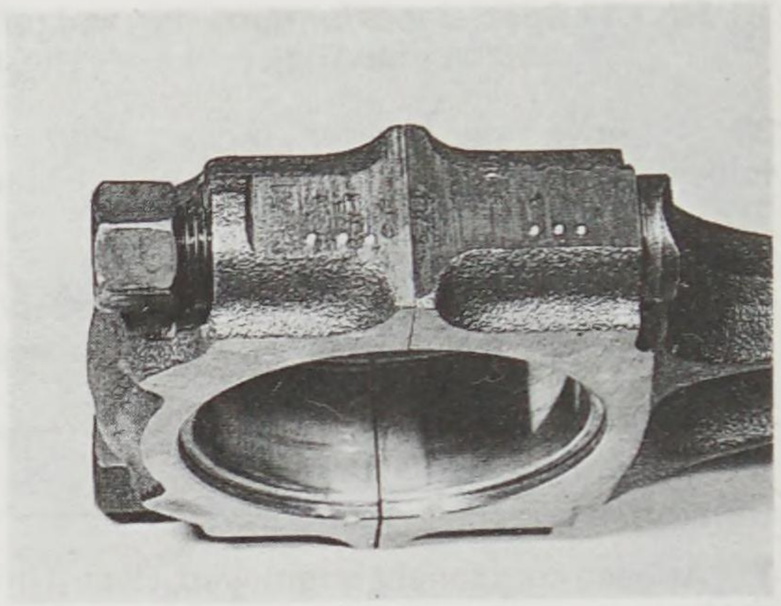
14.12B ... and recover the Woodruff key



14.13 Camshaft drivebelt rear covers



14.16 Timing plate and locating dowel (arrowed)



14.21 Identification marks on big-end cap and connecting rod (number 3 shown)

14 Engine – complete dismantling

1 Remove the ancillary components still on the engine:

(a) Alternator and adjustment strap
(b) Power steering pump
(c) Inlet and exhaust manifolds
(d) Clutch
(e) Fuel rail (fuel injection)
(f) Distributor, HT leads and spark plugs
(g) Wiring looms, taking careful note of their routing

2 Unbolt and remove the alternator mounting plate (photo).
3 Remove the oil filter.
4 Remove the oil pressure transmitter (photo).
5 Unscrew and remove the oil level sender (photo).
6 Remove the bolt securing the oil dipstick tube to the cylinder head then pull the tube from the crankcase (photo).
7 Unbolt and remove the oil filler and associated breather hoses.
8 Unbolt and remove the supplementary air device on fuel injection models (photo).
9 Unbolt and remove the thermostat/distributor housing.
10 Remove the cylinder head as described in Section 7. Jam the flywheel to prevent the engine turning while the crankshaft pulley bolt is undone (photo).
11 Remove the camshaft drivebelt tensioner (photo).
12 Remove the crankshaft sprocket and recover the Woodruff key (photos).
13 Remove the camshaft drivebelt rear covers (photo).
14 Unbolt and remove the water pump (Chapter 2).
15 Remove the clutch as described in Chapter 5.
16 Remove the timing plate from the engine rear web and recover its locating dowel (photo).
17 Remove the flywheel.
18 Remove the sump (Section 10).
19 Remove the oil pump (Section 11).
20 Prise out the crankshaft rear oil seal.
21 Make identification marks on the piston liners, connecting rods and big-end caps so they can all be kept together and also mark the positions of the liners in the crankcase. If the same liners are being refitted, they must be refitted in the same position from where they were removed. The marks can be made with a centre punch (photo), numbering 1 to 5 from the flywheel end.
22 Undo the big-end cap nuts and remove the caps, keeping the shells with the caps to which they belong.
23 Mark the main bearing caps, then undo and remove the caps, again keeping the shells with their original caps. Note that number 3 bearing has nuts on the cap and two side bolts through the crankcase.
24 Lift out the crankshaft.
25 Turn the engine onto its side and lift out the piston and liner assemblies.
26 The engine is now dismantled.

15 Engine components – examination and renovation (general)

1 With the engine dismantled, all components must be thoroughly cleaned and examined for wear, as described in the following Sections.
2 If a high mileage has been covered since new or the last engine rebuild, and general wear is evident, consideration should be given to renewing the engine with a reconditioned one.
3 If a single component has malfunctioned and the rest of the engine is in good condition endeavour to find out the cause of its failure if not readily apparent. For examine, if a bearing has failed, check that the adjoining oilways are clear; the new bearing will not last long if it is not being lubricated.
4 If uncertain about the condition of any components, seek a second opinion, preferably from a Peugeot Talbot dealer/mechanic who will obviously have an expert knowledge of your model and be able to advise on the best course of action.
5 Check on the availability of replacement parts before discarding the old ones. Check the new part against the old to ensure that you have the correct replacement.
6 Some of the measurements required will need the use of feeler blades or a micrometer, but in many instances wear will be visually evident or the old component can be compared with a new one.

16 Examination and renovation of dismantled components

Crankshaft and main bearings

1 Inspect the crankpin and main journals for scoring. Measure each journal in three different positions around its circumference, checking for ovality. If the journals are more than 0.007 mm (0.0002 in) out-of-round, or scoring is evident, the crankshaft must be reground.

2 Also inspect the crankshaft for cracks, which if evident will mean its renewal. A sound crankshaft, when suspended on string and struck with a metal object will produce a clear bell-like tone. A cracked crankshaft will produce a dull, muffled sound.

3 The bearing shells are normally a dull, matt grey colour. On worn bearings, the surface material will be worn away and the core metal will show through as a different colour.

4 If the crankshaft is being reground, new oversize bearings will be supplied to match. Note that manufacturer's original size bearings are marked with a dab of white paint on their sides; oversize bearings have green or yellow paint marks.

5 New thrustwashers controlling endfloat will also be supplied. All four thrustwashers must be of the same thickness.

6 If no regrinding is required, ensure that the new bearing shells have the same colour paint marks as the originals.

7 If it is found that a reground crankshaft is itself worn, consideration should be given to obtaining a factory re-conditioned engine unit. Consult your dealer.

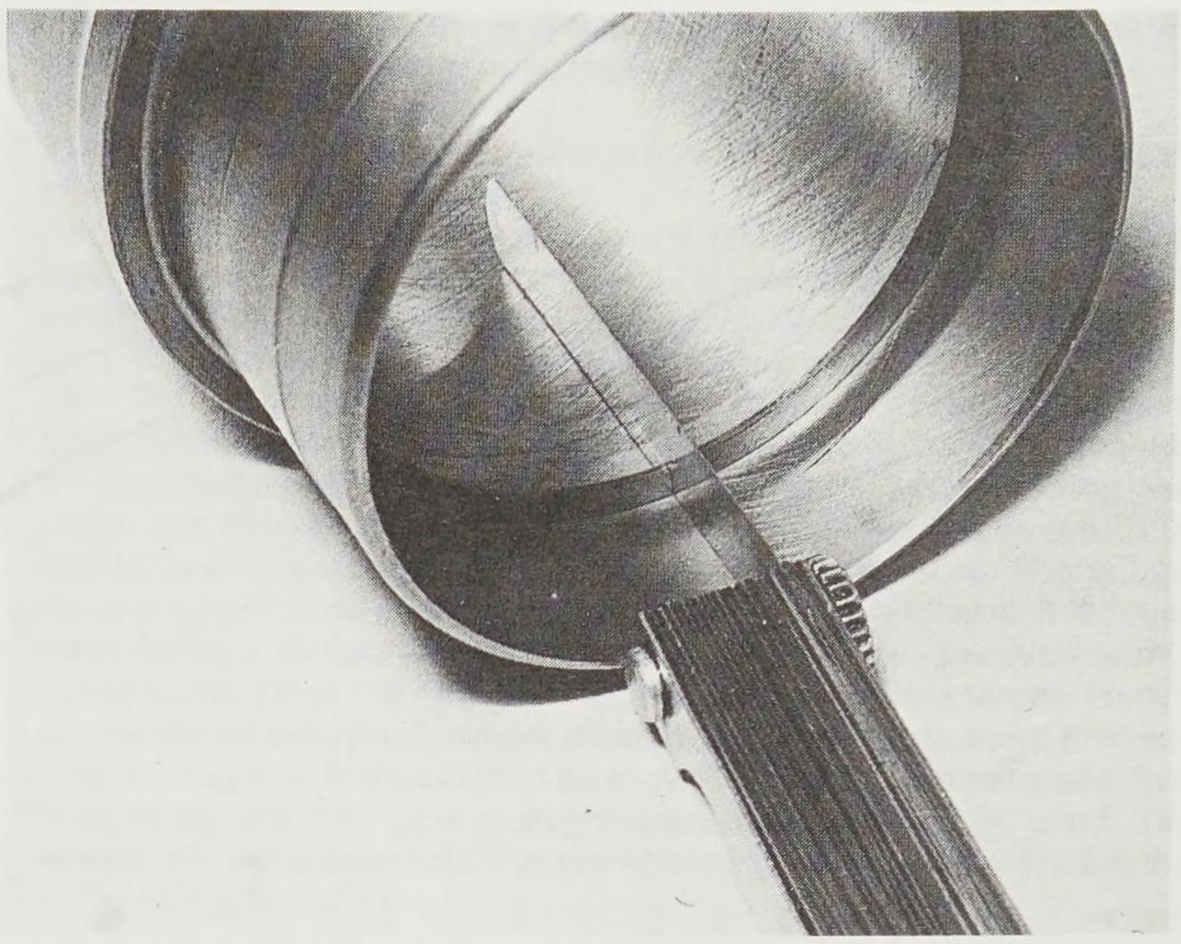
Big-end bearings

8 The same comments as for main bearings apply equally to the big-end bearings.

Cylinder liners and piston assemblies

9 The liner bores may be examined for wear either in or out of the engine block; the cylinder head must, of course, be removed in each case.

10 First of all examine the top of the cylinder about a quarter of an inch below the top of the liner and with a finger feel if there is any ridge running round the circumference of the bore. In a worn cylinder bore a ridge will develop at the point where the top ring on the piston comes to the uppermost limit of its stroke. An excessive ridge indicates that the bore below the ridge is worn. If there is no ridge, it is reasonable to assume that the cylinder is not badly worn. Measurement of the diameter of the cylinder bore both in line with the piston gudgeon pin and at right angles to it, at the top and bottom of the cylinder, is another check to be made. A cylinder is expected to wear at the sides where the thrust of the piston presses against it. In time this causes the cylinder to assume an oval shape. Furthermore, the top of the cylinder is likely to wear more than the bottom of the cylinder. It will be necessary to use a proper bore measuring instrument in order to measure the differences in bore diameter across the cylinder, and variations between the top and bottom ends of the cylinder. As a general guide it may be assumed that any variation more than 0.25 mm (0.010 in) indicates that the liners should be renewed. Provided all variations are less than 0.25 mm (0.010 in) it is probable that the fitting of new piston rings will cure the problem of piston-to-cylinder bore clearances. Once again it is difficult to give a firm ruling on this as so much depends on the amount of time, effort and money which the individual owner is prepared, or wishes, to spend on the task. Certainly if the cylinder bores are obviously deeply grooved or



16.15 Measuring a piston ring end gap

scored, the liners must be renewed, regardless of any measurement differences in the cylinder diameter.

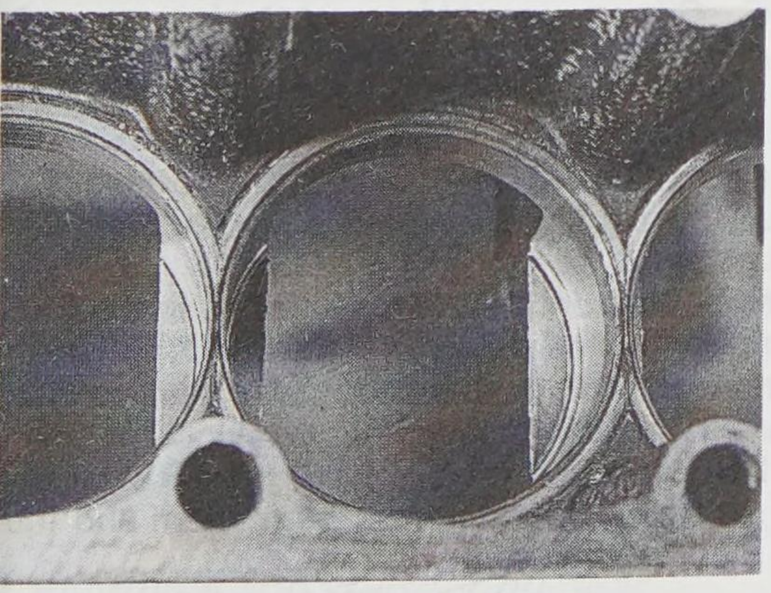
11 If new piston liners or pistons are required, remember that the diameter grading must match, and all four liner/pistons must be of the same grade, ie: A, B or C grade.

12 Examine the piston surface and look for signs of any hairline cracks especially round the gudgeon pin area. Check that the oil drain holes below the oil control ring groove are clear, and, if not, carefully clean them out using a suitably sized drill, but don't mark the piston.

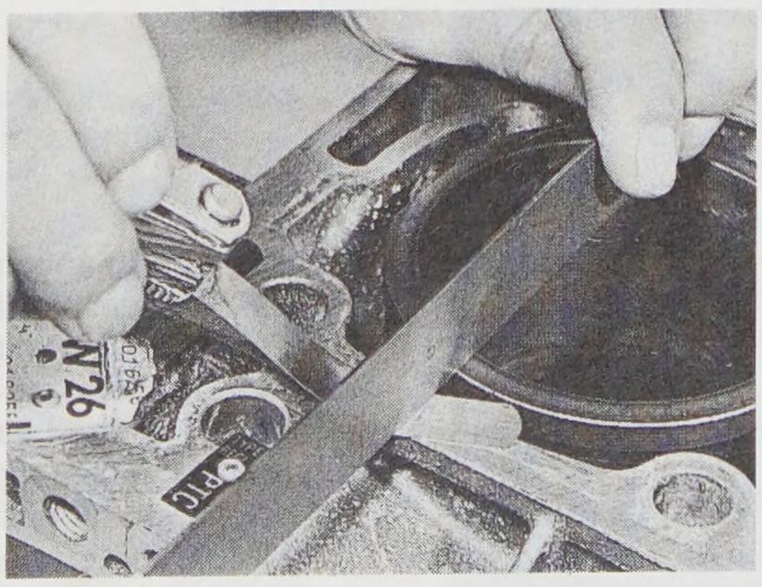
13 If any of the pistons are obviously badly worn or defective they must be renewed. A badly worn top ring land may be machined to accept a wider, stepped ring, the step on the outer face of this type of ring being necessary to avoid fouling the unworn ridge at the top of the cylinder bore.

14 Providing the engine has not seized up or suffered any other severe damage, the connecting rods should not require any attention other than cleaning. If damage has occurred or the piston/s show signs of irregular wear it is advisable to have the connecting rod alignment checked. This requires the use of specialised tools and should therefore be entrusted to a Peugeot Talbot agent or a competent automotive engineer, who will be able to check and realign any defective rods.

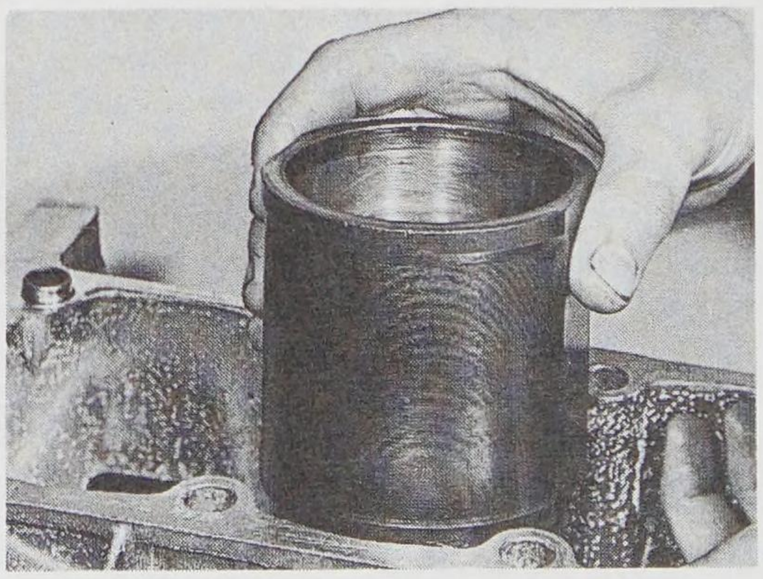
15 New Peugeot Talbot rings are supplied with their gaps already preset, but if you intend to use other makes the gaps should be checked and adjusted if necessary. Before fitting the new rings on the pistons, each should be inserted approximately 75 mm (3 in) down the cylinder bore and the gap measured with a feeler gauge. This should be between 0.38 mm (0.015 in) and 0.97 mm (0.038 in). It is essential that the gap should be measured at the bottom of the ring travel, as if it is measured at the top of a worn bore and gives a perfect fit, it could easily seize at the bottom. If the ring gap is too small, rub down the ends of the ring with a very fine file until the gap, when fitted, is correct. To keep the rings square in the bore for measurement, line each up in turn by inserting an old piston in the bore upside down, and use the piston to



16.17A Liner seats in cylinder block



16.17B Fitting a cylinder liner



16.17C Measuring cylinder liner protrusion

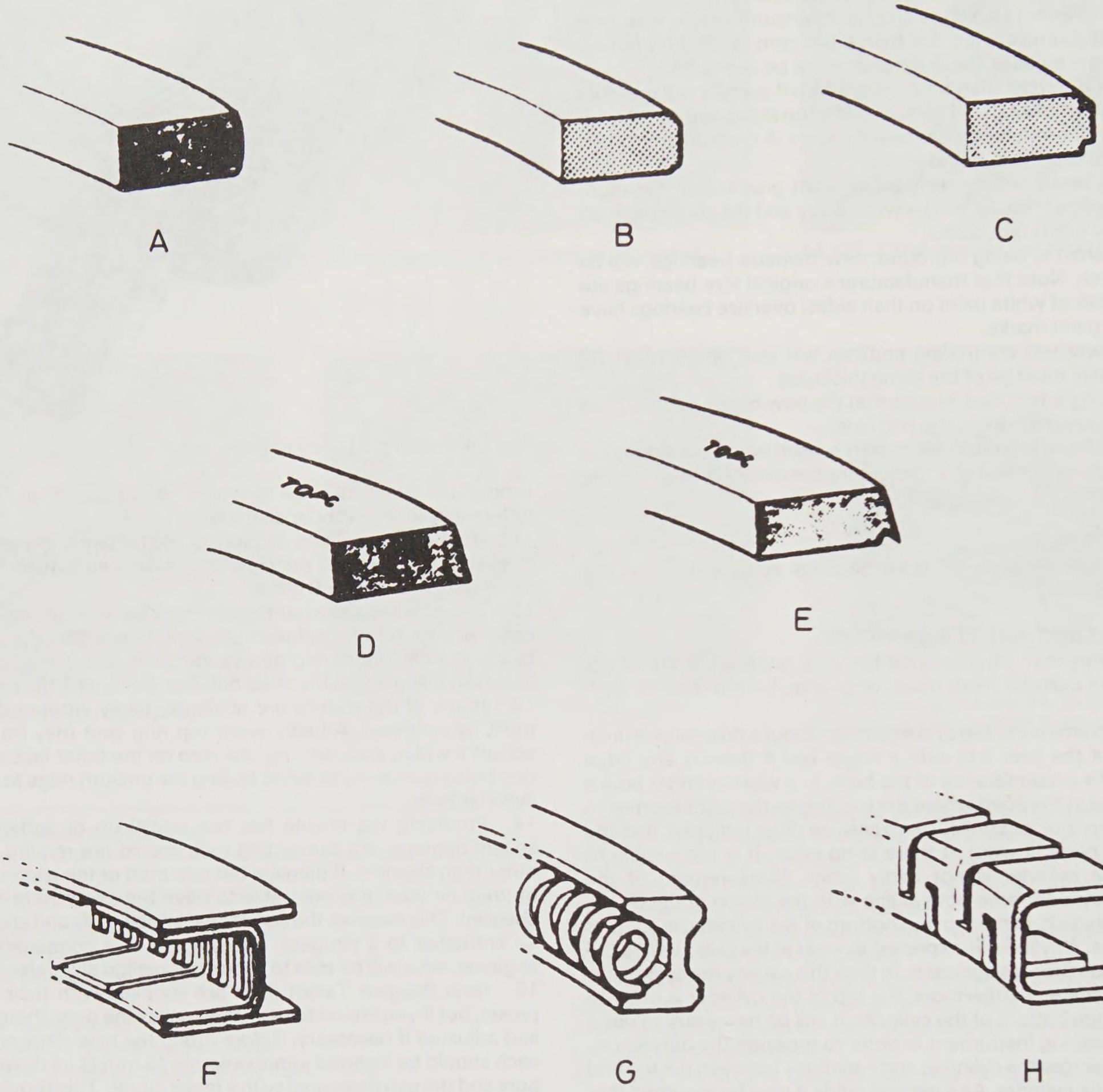


Fig 1.12 Piston ring identification (Sec 16)

A Top ring – chrome, convex
B Top ring – flat, chamfered
C Top ring – flat, grooved
D 2nd ring – tapered, plain
E 2nd ring – hooked, plain
F Oil ring – double segment, steel
G Oil ring – monobloc, cast steel
H Oil ring – U-flex, steel

push the ring down. Remove the piston and measure the piston ring gap (photo).

Cylinder liner protrusion

16 Liner protrusion is determined by the machining dimensions of the liners and cylinder block, and is not adjustable.

17 To measure liner protrusion, ensure that the liners and their seats in the cylinder block are clean, then fit the liners without their seals in their original positions as previously marked if the old liners are being re-used (photos).

18 Place a straight edge across each liner and use a feeler gauge to determine cylinder liner protrusion. Any rocking of the liner on its seat will give a false reading.

19 Also measure the height difference between adjacent liners. Protrusion and height difference tolerance are given in the Specifications.

20 New liners can be rotated 180° or re-positioned in the block to effect the desired values. Old liners which will not produce the tolerances are best scrapped. Consult your dealer.

21 Once the liners are satisfactorily positioned, mark them and the block so the liners can be refitted in the same position.

Piston rings

22 Various types of piston ring may be encountered. The rings are easily broken during fitting and one way of preventing this is to use

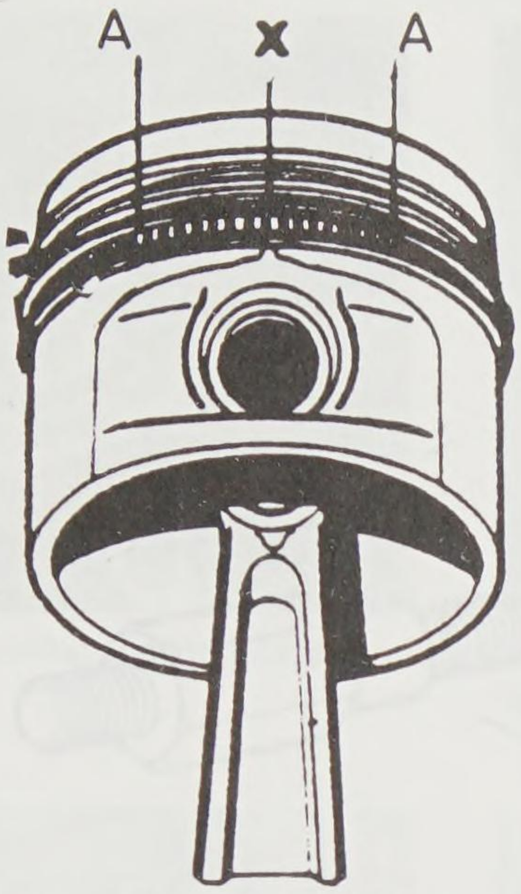


Fig 1.13 Piston ring gap positioning (Sec 16)

X Oil control ring gap
A Scraper ring gap positions on double segment rings

three or four old feeler gauge blades spaced equidistant around the piston while the rings are slid carefully onto the piston over the blades. This prevents the rings entering the wrong groove. Fit the oil control ring first, then the second ring and finally the top compression ring. Note that the oil control ring can be fitted any way up, the centre ring must be fitted with the mark 'TOPC' uppermost, and the top compression ring can be fitted any way up, provided it is not landed to accommodate the liner wear ridge.

23 Once the rings are fitted to the piston, arrange the ring gaps so that the gaps of the top two rings are 120° apart.

24 The gap on the oil control ring must be in line with the gudgeon pin. Furthermore, on double segment rings the gaps of the two scraper rings must be 20 to 30 mm from the expander ring gap.

25 U-flex oil control rings have no gap. When fitting pistons which have U- flex rings to the cylinder liners, the pistons must be inserted into the liner from the bottom. Special care needs to be taken when compressing the rings with the ring compressor.

Gudgeon pins

26 The gudgeon pins float in the piston and are an interference fit in the connecting rods. This interference fit between gudgeon pin and connecting rod means that heat is required (230 to 260°C/446 to 500°F) before a pin can be satisfactorily fitted in the connecting rod. If it is necessary to renew either the piston or connecting rod, we strongly recommend that the separation and assembly of the two be entrusted to someone with experience. Misapplied heat can ruin one, or all, of the components very easily.

27 Never re-use a piston if the original gudgeon pin has been removed from it.

Connecting rod/piston

28 With the pistons removed from the liners, carefully clean them and remove the old rings, keeping them in order and the correct way up. The ring grooves will have to be cleaned out, especially the top, which will contain a burnt carbon coating that may prevent the ring from seating correctly. A broken piston ring will assist in groove cleaning. Take care not to scratch the ring lands or piston surface in any way.

29 The top ring groove is likely to have worn the most. After the groove has been cleaned out, refit the top ring and any excessive wear will be obvious by a sloppy fit. The degree of wear may be checked by using a feeler gauge.

Flywheel and starter ring gear

30 There are two areas in which the flywheel may have been worn or damaged. The first is on the driving face where the clutch friction plate bears against it. Should the clutch plate have been permitted to wear down beyond the level of the rivets, it is possible that the flywheel will have been scored. If this scoring is severe it may be necessary to have it refaced or even renewed.

31 Evidence of tiny cracks on the flywheel driving face will indicate that overheating has occurred.

32 The other part to examine is the teeth of the starter ring gear around the periphery of the flywheel. If several of the teeth are broken or missing, or the front edges of all teeth are obviously very badly chewed up, then it would be advisable to fit a new ring gear.

33 The old ring gear can be removed by cutting a slot with a hacksaw down between two of the teeth as far as possible, without cutting into the flywheel itself. Once the cut is made a chisel will split the ring gear which can then be drawn off. To fit a new ring gear requires it to be heated first to a temperature of 220°C (428°F), no more. This is best done in a bath of oil or an oven, but not with a naked flame. It is much more difficult to heat evenly and to the required temperature with a naked flame. Once the ring gear has attained the correct temperature it can be placed onto the flywheel, making sure that it beds down properly onto the register. It should then be allowed to cool down naturally. If by mischance, the ring gear is overheated, it should not be used. The temper will have been lost, thereby softening it, and it will wear out in a very short space of time.

Camshaft drivebelt, sprockets and tensioner

34 Inspect the drivebelt for any signs of cracking, splitting or fraying, particularly at the roots of the teeth, and for any signs of oil contamination. Renew the drivebelt if any of these conditions are apparent. The drivebelt should be renewed as a matter of course if the engine is undergoing major overhaul or repair.

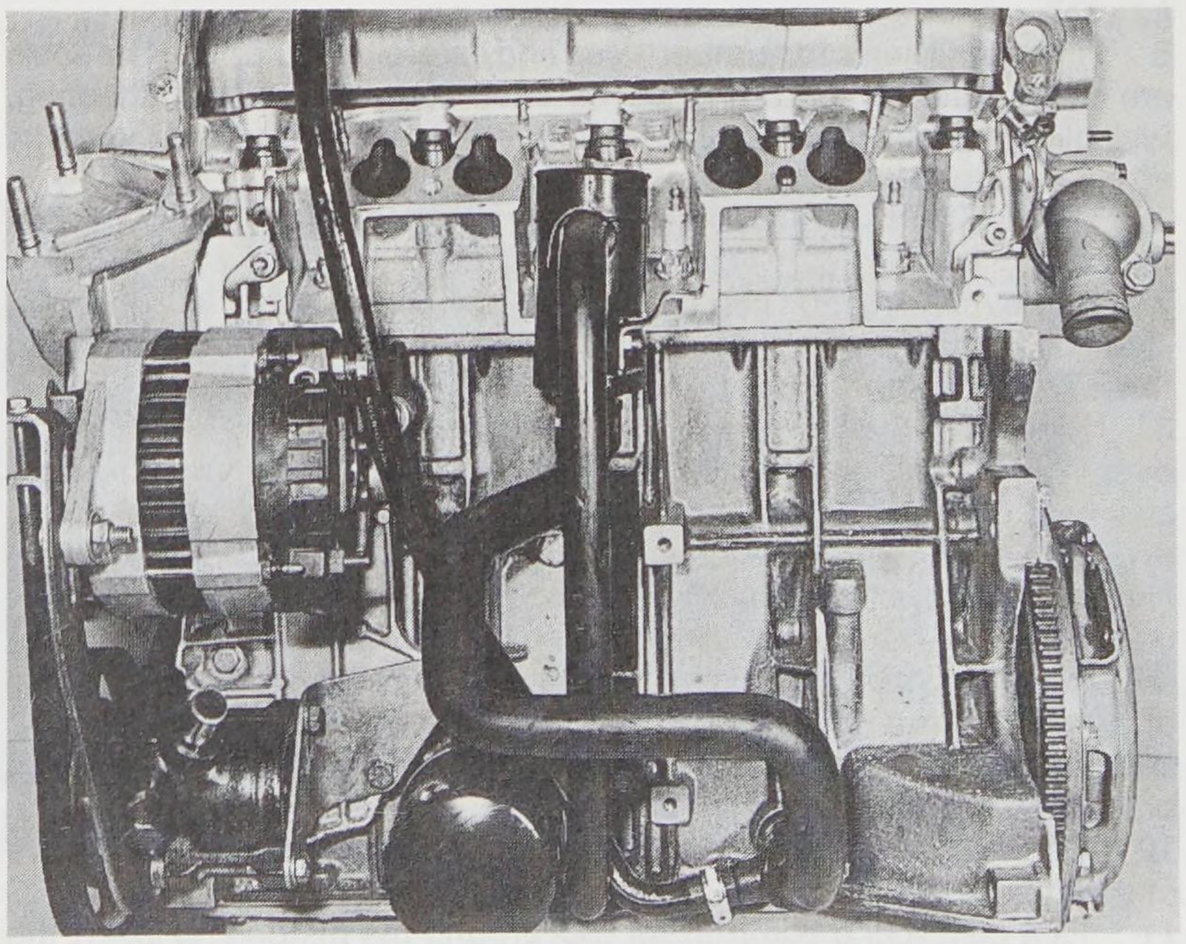
35 Inspect the tensioner roller bearing for roughness and the sprockets for chipping or wear of the teeth. Renew any worn or suspect components.

17 Crankcase breather system – general

1 The crankcase breather hoses are connected in to the oil filler tube (photo).

2 There are additional hoses connected to the oil filler cap.

3 The hoses should be inspected periodically for signs of blockage due to oil emulsification. If this condition is evident remove the hoses and wash them out in solvent. Renew any hoses showing signs of collapse or perishing.



17.1 Crankcase breather hoses

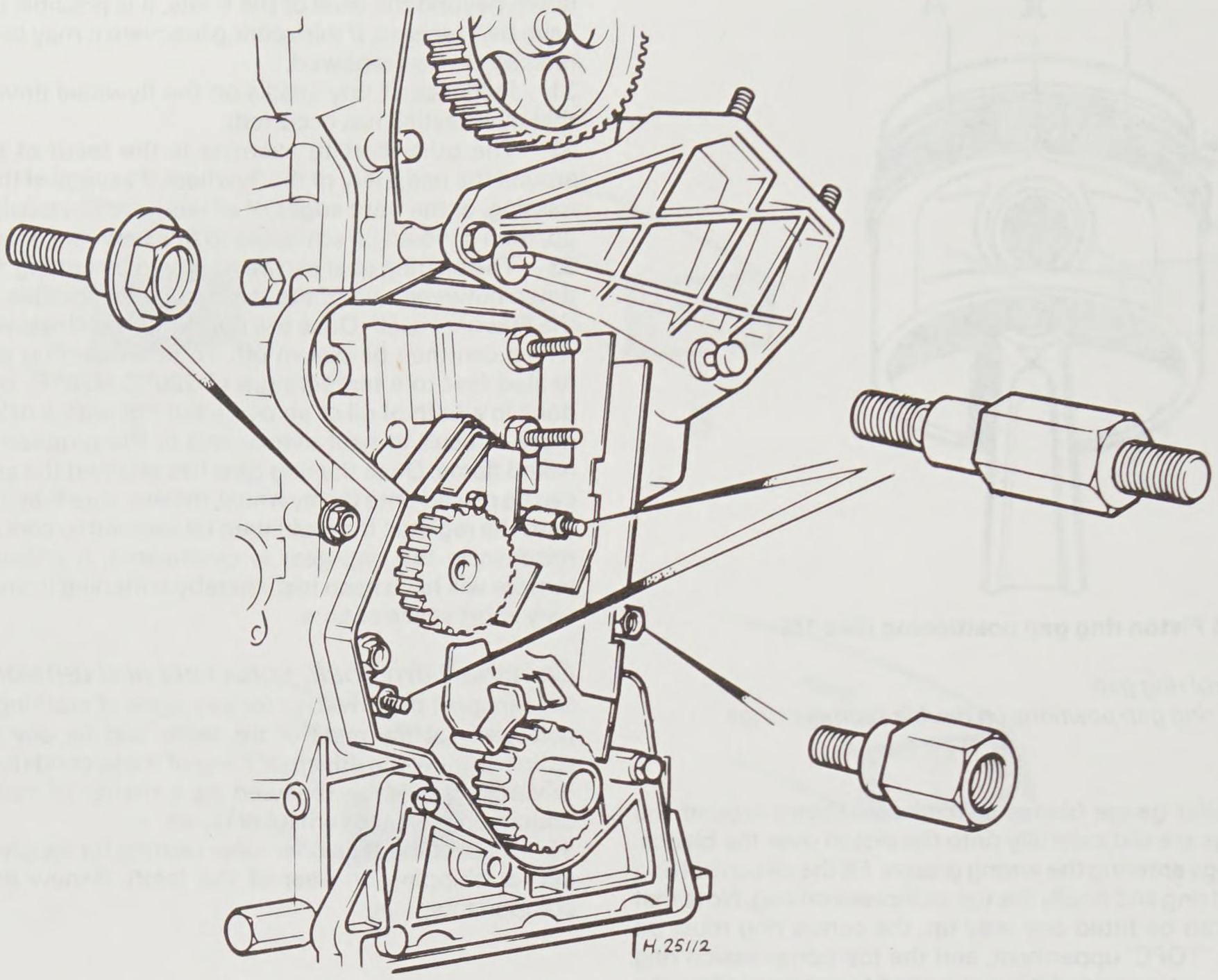
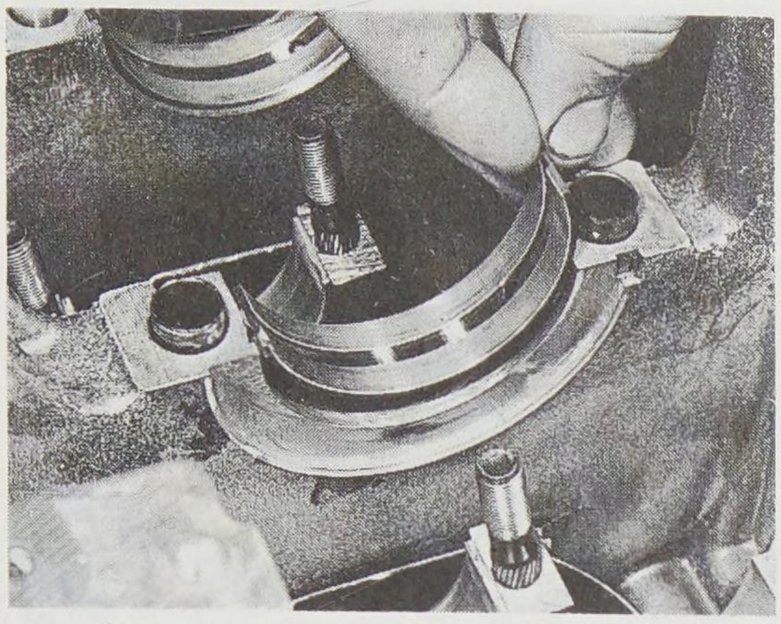


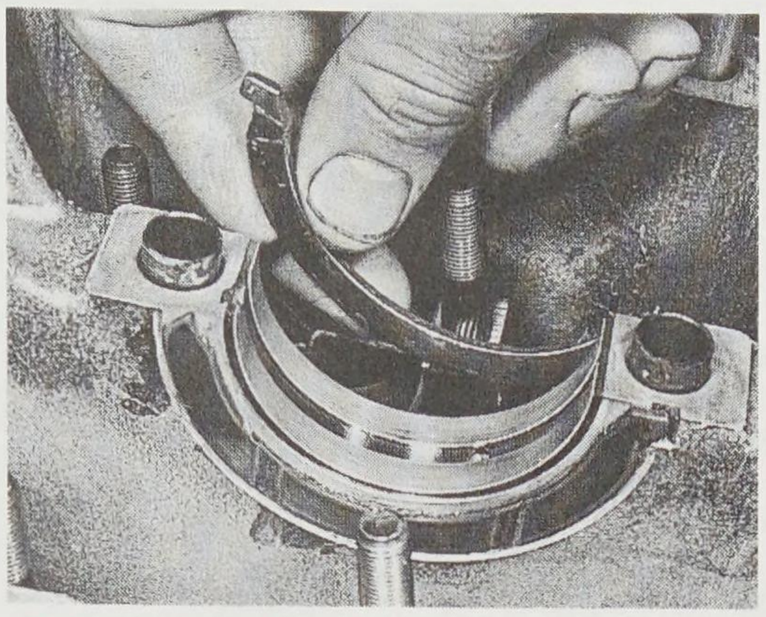
Fig 1.14 Camshaft drivebelt rear cover special bolts (Sec 18)

18 Engine – reassembly

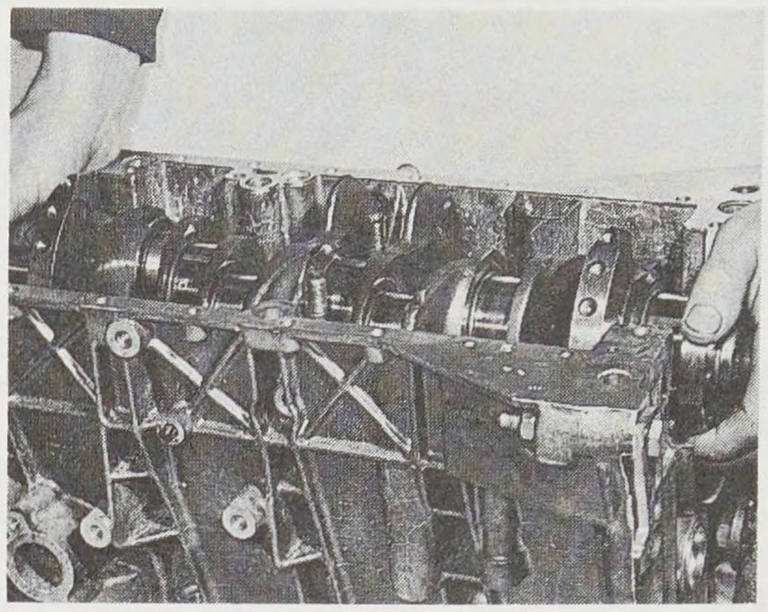
1 Fit the main bearing upper shells to the journals in the crankcase. Make sure the nibs in the shells locate in the cutouts on the journals and the locating dowels are in place (photo).
2 Fit the crankshaft thrustwashers which control endfloat to either side of number 2 main bearing. The grooves face outward and the washers can be retained in position with a little grease (photo).
3 Oil the bearings and lower the crankshaft into position (photo). Ensure the thrustwashers are not dislodged.
4 Fit the lower half of the bearing shells to the main bearing caps. Oil the shells and fit caps 2 to 4, with the thrustwashers on number 2 cap (photo).
5 Fit the side seals to number 1 cap and carefully fit the cap. The seals are easily distorted on fitting, so we used some thin plastic sheeting, well oiled, to keep them in place during fitting, and withdrew the strips afterwards (photo).
6 Trim the side seals to protrude approximately 2 mm above the cap face.
7 Fit the main bearing cap bolts and the nuts to number 3 cap. Fit the side bolts to number 3 cap then tighten all the bolts/nuts to the specified torque, the side bolts last (photos).
8 Now check the crankshaft endfloat by pushing the crankshaft hard over in one direction and checking the gap between the thrustwasher and web on number 2 main bearing (photo). If the endfloat is not as specified, change the thrustwashers to achieve the specified tolerance.
Note: *All four thrustwashers must be the same thickness.*
9 Fit a new oil seal to the flywheel end of the crankshaft. Lubricate the seal and fit it with its lips facing inward. Tap the seal home with a piece of tube the same diameter as the seal. We used a thin strip of plastic sheet, well lubricated, to start the seal over the crankshaft flange, so protecting the lips of the seal (photo).
10 Oil the assembled piston/connecting rod assemblies and the bore of the cylinder liners.
11 Fit a piston ring compressor tool around the piston and insert the piston into the liner (photo).
12 The arrow on the piston crown must face the camshaft drivebelt end of the engine (photo).
13 Repeat the operation on the other three piston/liner assemblies.
14 Fit new seals to the liners (photo).
15 Oil and fit the upper half of the big-end bearing shells to the connecting rod (photo).
16 Insert the piston/liner assemblies into the crankcase in their original positions as previously marked, ensuring the liners are located correctly on the seals, and guiding the connecting rods onto the crankshaft.
17 Fit cylinder liner clamps as before.
18 Fit the lower half of the bearing shells to the big-end bearing caps. Oil the shells and then fit the caps to the big-ends. Tighten the nuts to the specified torque, which involves angle tightening more fully described in Section 7 for the cylinder head bolts (photos).
19 Fit the oil pump as described in Section 11.
20 Fit a new oil seal to the front oil seal housing. Grease the lips of the seal and tap it home with a socket, lips facing inward (photo).
21 Coat the joint face of the housing with sealant, then fit the housing and tighten the bolts (photos).
22 Fit the sump as described in Section 10.
23 Fit the flywheel to the crankshaft flange, ensuring it fits over the locating spigot. Apply thread-locking compound to new bolts and fit and tighten the bolts progressively to the specified torque (photos).
24 Fit the timing plate spigot to the engine rear flange, then fit the timing plate and tighten its securing bolt.
25 Bolt the alternator mounting plate to the side of the cylinder block.
26 Fit the clutch (Chapter 5).
27 Turn the engine onto its side, then rotate the crankshaft to bring all pistons to mid-stroke (none at TDC).
28 Remove the liner clamps.
29 Fit the cylinder head as described in Section 7.
30 Fit the camshaft sprocket backplate, using a 10 mm dowel through the timing hole to line the backplate up before tightening the bolts.
31 Fit the camshaft sprocket, using the dowel to prevent the camshaft rotating while the sprocket bolt is tightened.
32 Fit the engine right-hand mounting bracket (photo).



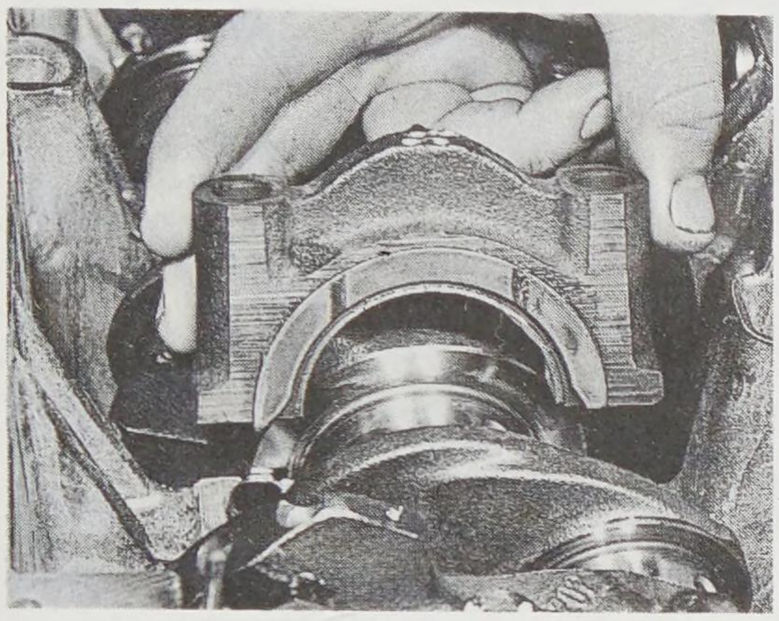
18.1 Fitting a main bearing shell to journal in crankcase



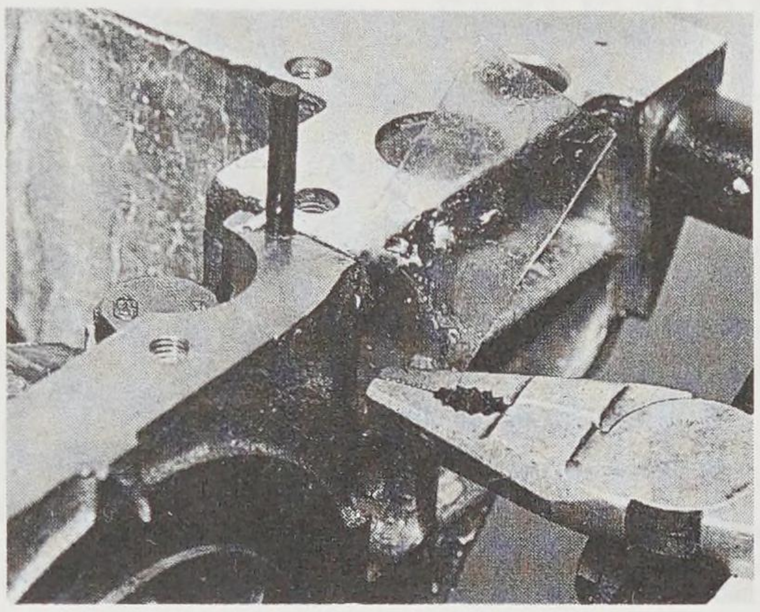
18.2 Fitting crankshaft thrustwasher to number 2 bearing



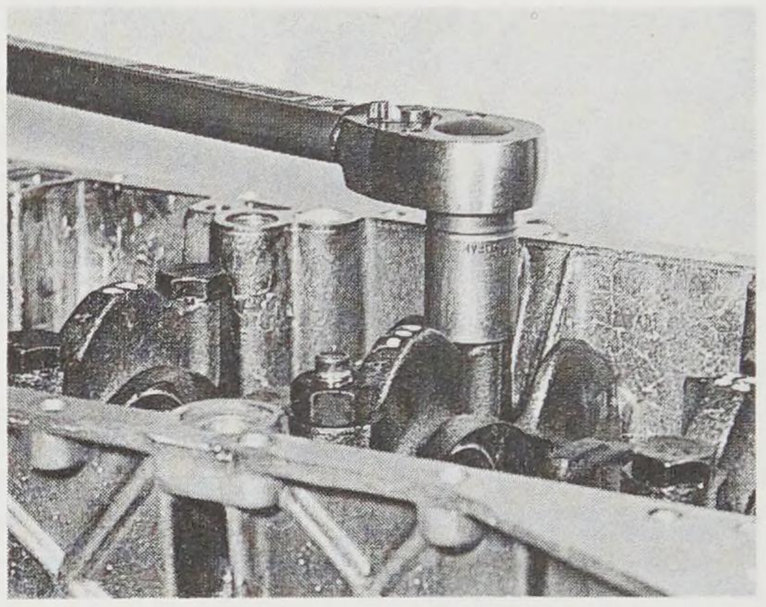
18.3 Lowering the crankshaft onto the crankcase



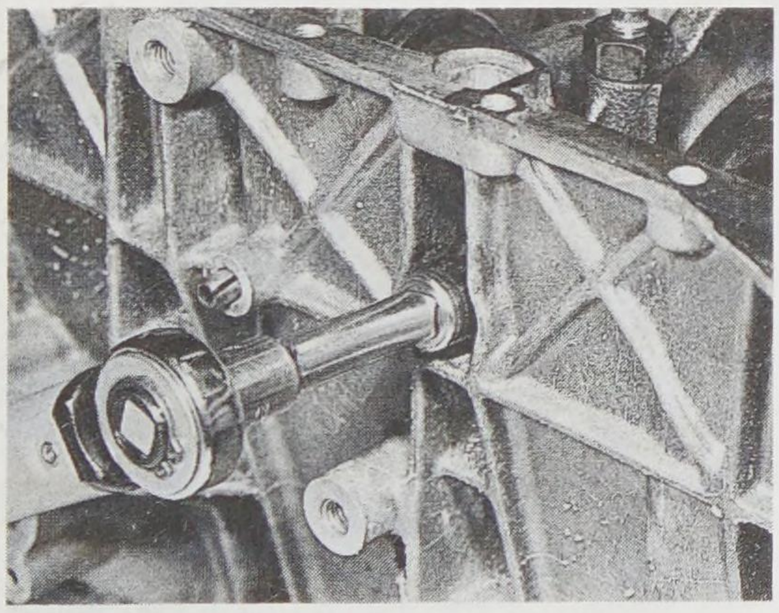
18.4 Fitting number 2 main bearing cap with thrustwasher



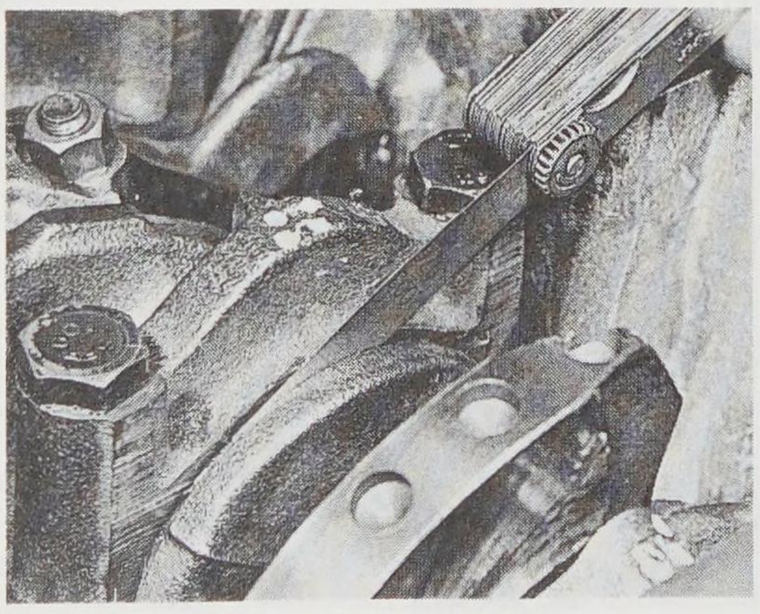
18.5 Withdrawing the thin plastic sheet from number 1 bearing side seal



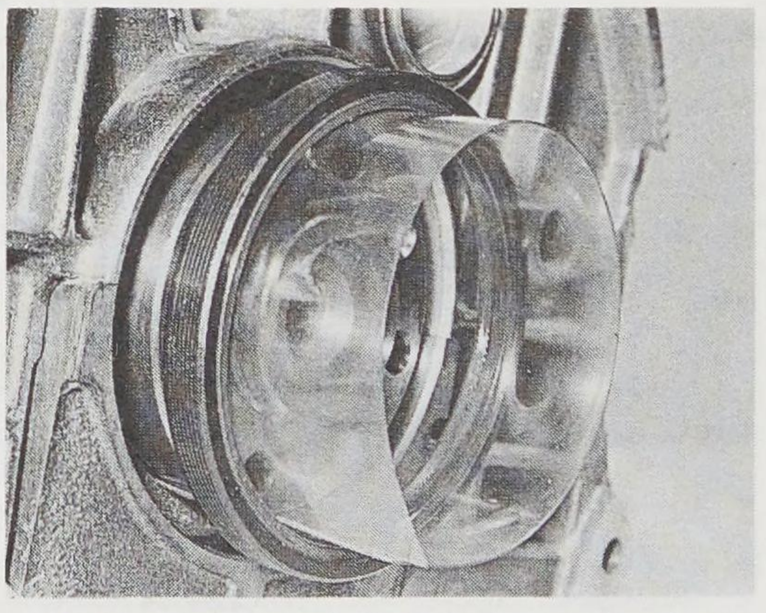
18.7A Tightening number 3 main bearing nuts ...



18.7B ... and side bolts

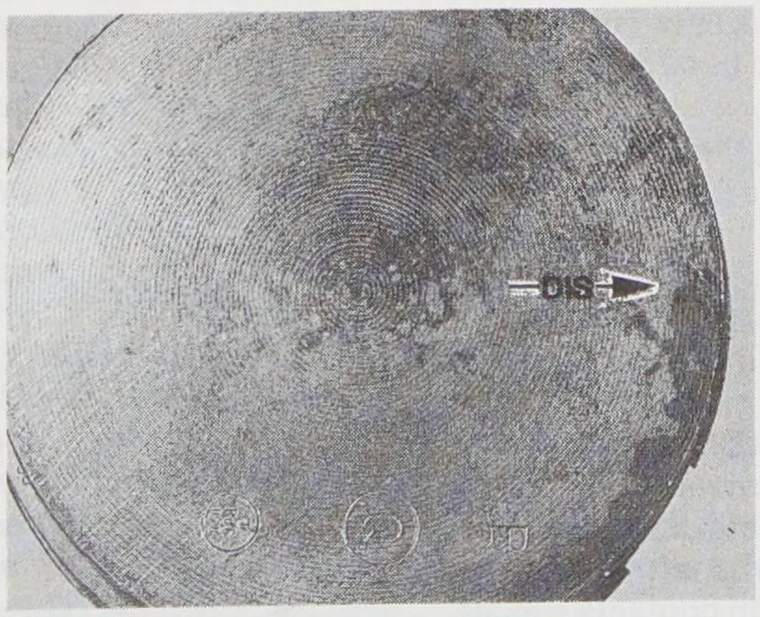


18.8 Measuring crankshaft endfloat

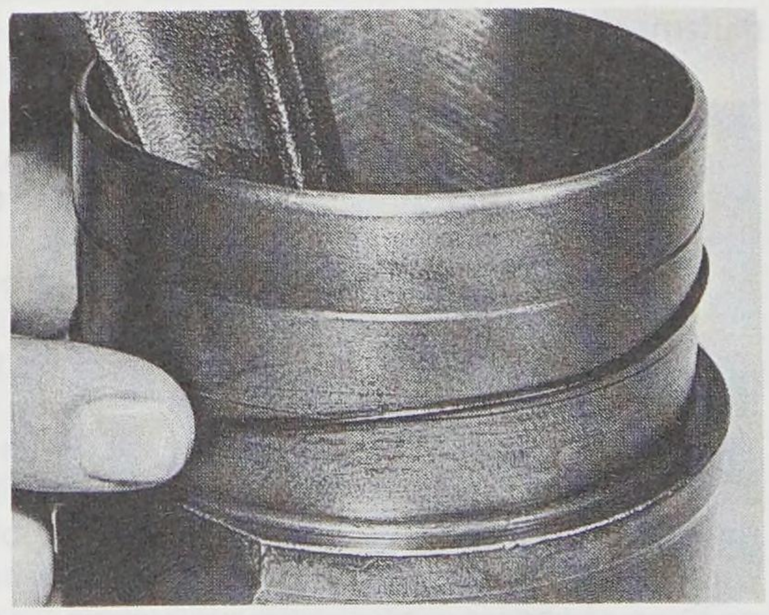


18.9 Fitting the crankshaft seal over flywheel flange

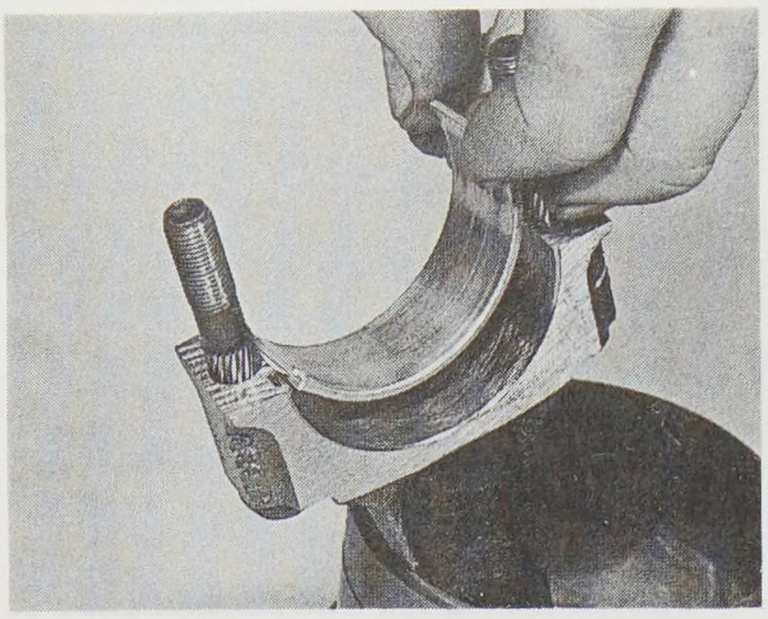
18.11 Inserting a piston into its liner



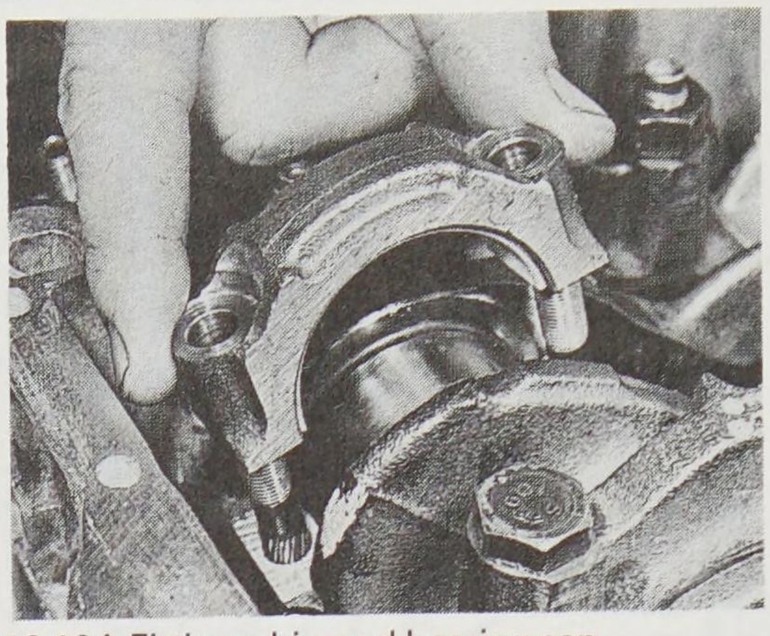
18.12 Direction arrow on piston crown



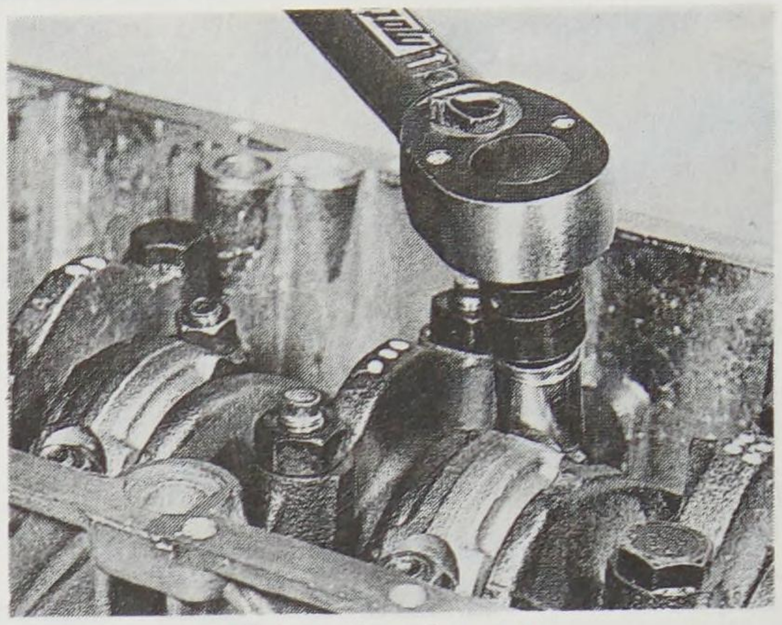
18.14 Fitting a piston liner seal



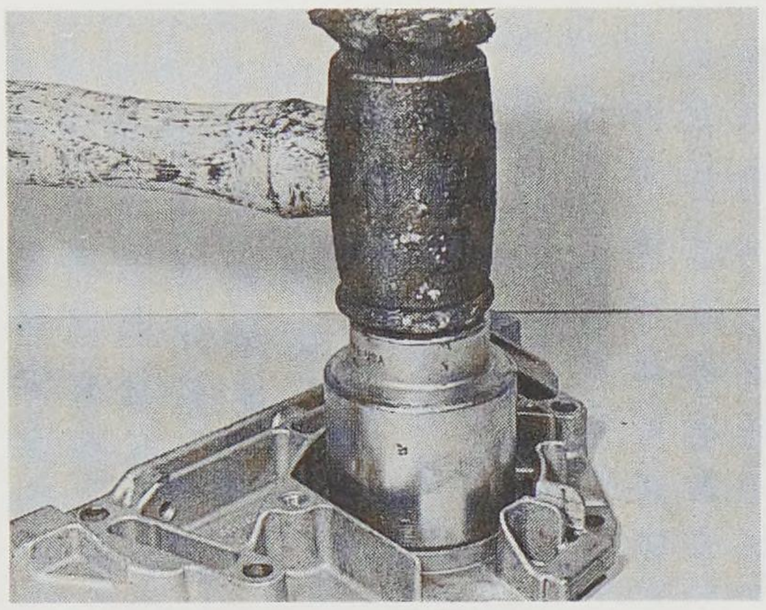
18.15 Fitting a big-end bearing shell



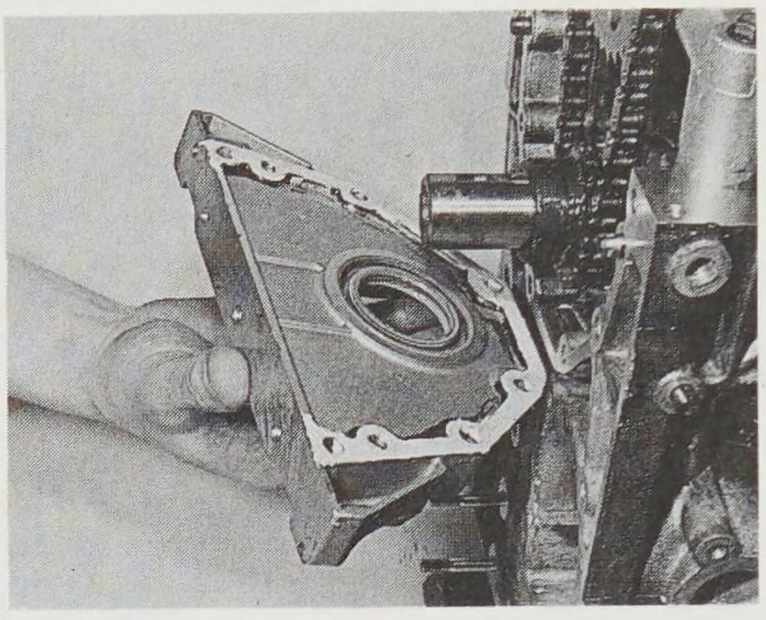
18.18A Fitting a big-end bearing cap ...



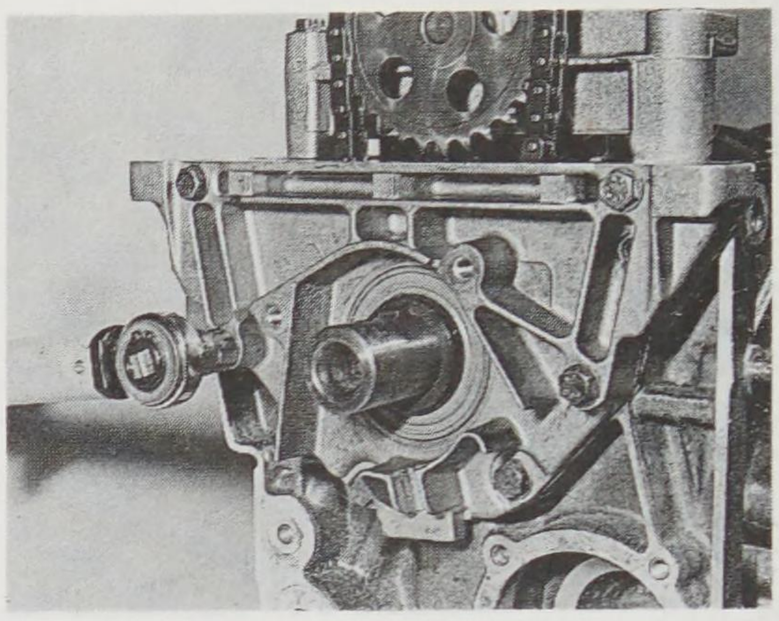
18.18B ... and tightening the nuts



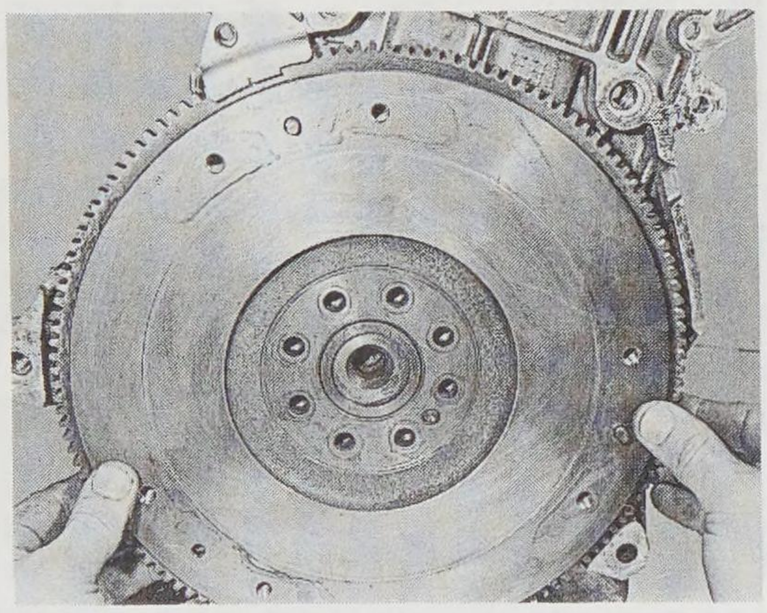
18.20 Fitting the oil seal to the oil seal housing



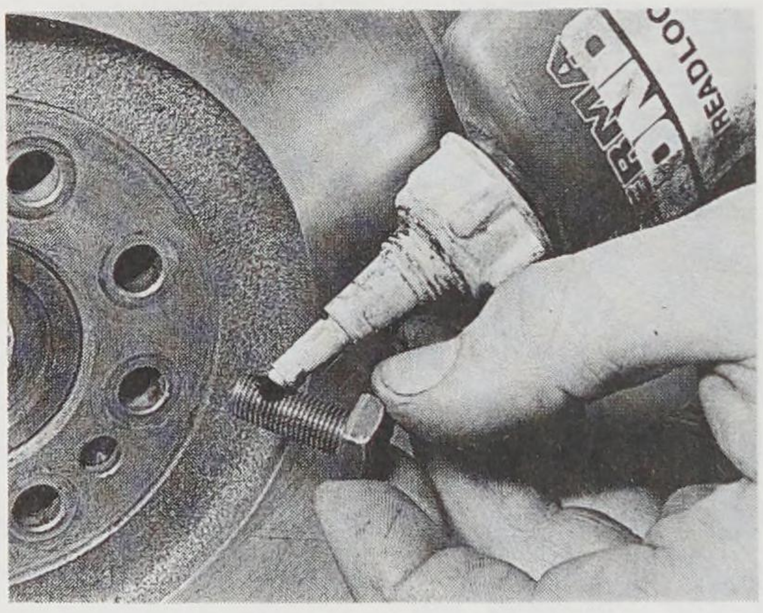
18.21A Fit the housing ...



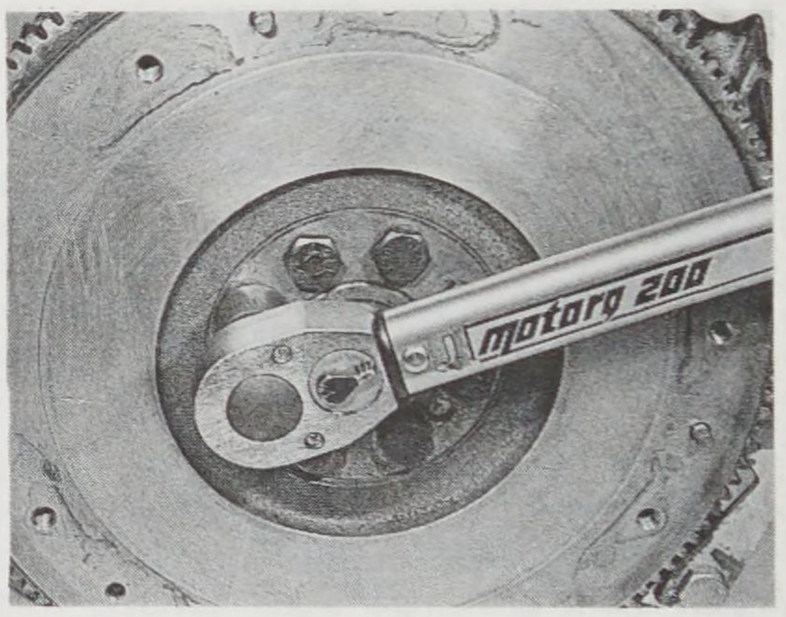
18.21B ... and tighten the bolts



18.23A Fit the flywheel ...



18.23B ... apply thread-locking compound ...



18.23C ... and tighten the bolts

33 Fit the water pump as described in Chapter 2.

34 Fit the camshaft drivebelt rear covers, noting the positions of the special bolts. Apply thread-locking compound to the bolt threads before fitting.

35 Fit the Woodruff key and crankshaft sprocket.

36 Fit the camshaft drivebelt tensioner but leave the mounting bolts loose. Compress the tensioner spring by turning the cam to the horizontal position and tightening the locknut.

37 Fit the crankshaft pulley, but only tighten the bolt lightly.

38 Carefully turn the crankshaft until the timing dowel can be inserted through the pulley and into the recess in the front plate. If piston to valve contact occurs, back off and try again with the camshaft in a different position. Do not try to force the crankshaft if a piston contacts a valve.

39 Remove the crankshaft pulley and fit the camshaft drivebelt as described in Section 5.

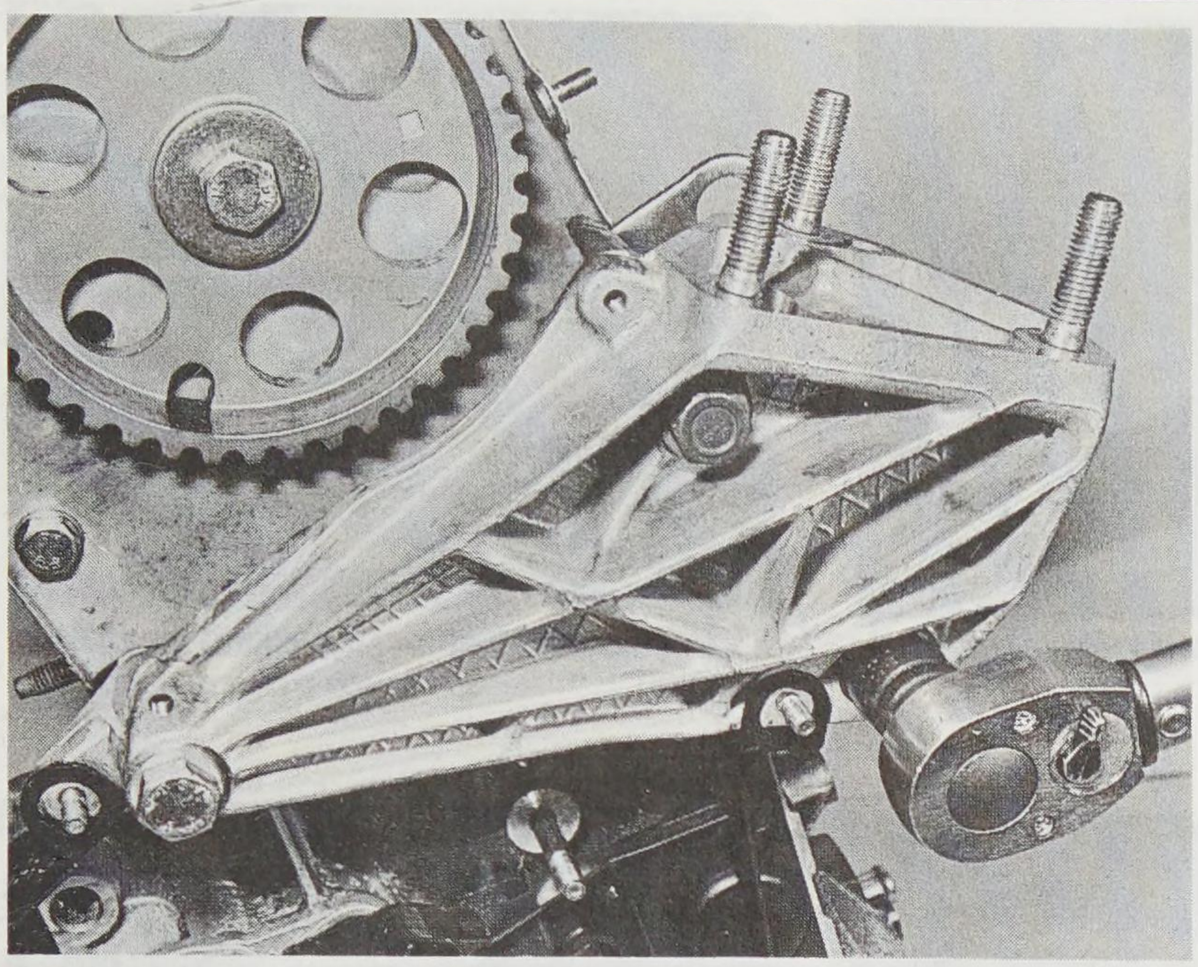
40 Fit the following ancillary components, which is a reversal of removal, referring to the relevant Chapter/Section:

(a) Oil pressure switch and level sender, using new sealing washers
(b) Oil filler tube and crankcase breather hoses
(c) Oil dipstick tube
(d) Alternator and power steering pump
(e) Distributor/thermostat housing, using a new gasket
(f) Supplementary air device on fuel injection models
(g) Clutch (Chapter 5)
(h) Water distribution housing (if removed – see Chapter 2)
(i) Inlet and exhaust manifolds
(j) Carburettor or fuel rail as applicable
(k) Distributor and spark plugs (Chapter 4)
(l) New oil filter
(m) Fit and connect the engine electrical looms
(n) Fit the power steering high pressure hose

41 Fit the transmission unit to the engine.

42 Fit the TDC sensor and clip the lead to the camshaft cover.

43 Fit new sealing washers to the engine and transmission drain plugs, fit and tighten the plugs.



18.32 Fitting the engine right-hand mounting bracket

19 Engine and transmission unit – refitting

Note: *Information on connections, attachments and adjustments specific to automatic transmission models will be found in Chapter 6, Section 19.*

1 Refitting is a reversal of removal, noting the following:

(a) Adjust the clutch cable (Chapter 5)
(b) Adjust the accelerator cable (Chapter 3)
(c) Fill the engine with the specified oil (Section 2)
(d) Fill the transmission unit with the specified oil (Chapter 6)
(e) Fill the power steering system with the specified fluid, and bleed the system once the engine is running (Chapter 9)
(f) Fill and bleed the cooling system (Chapter 2)
(g) Where fitted, renew all self-locking nuts
(h) Apply thread-locking compound to the threads of the right-hand driveshaft intermediate bearing housing before fitting the bolts

20 Engine – initial start-up after overhaul

1 Make sure that the battery is fully charged and that all lubricants, coolant and fuel are replenished.
2 It will require several revolutions of the engine on the starter motor to pump the petrol up to the carburettor.
3 As soon as the engine fires and runs, keep it going at a fast tickover only (no faster) and bring it up to the normal working temperature.
4 As the engine warms up there will be odd smells and some smoke from parts getting hot and burning off oil deposits. The signs to look for are leaks of water or oil which will be obvious if serious. Check also the exhaust pipe and manifold connections, as these do not always 'find' their exact gastight position until the warmth and vibration have acted on them, and it is almost certain that they will need tightening further. This should be done with the engine stopped.
5 When normal running temperature has been reached, adjust the engine idling speed, as described in Chapter 3. Run the engine until the fan cuts in and then switch off. Check that no oil or coolant is leaking with the engine stationary.
6 Check and adjust the valve clearances.
7 Check the ignition timing.
8 Road test the car to check that the timing is correct and that the engine is giving the necessary smoothness and power. Do not race the engine – if new bearings and/or pistons have been fitted it should be treated as a new engine and run in at a reduced speed.
9 Change the engine oil at 1000 miles (1500 km) if many of the engine internal components have been renewed. At the same mileage, check the tension of the drivebelt.

PART C: XU9J4 ENGINE

21 General description

1 Refer to Part A, Section 1. As pointed out in the general description, the XU9J4 engine is a development of the XU9J2 engine, and where no specific mention of a particular component or procedure is given in this Part C, reference should be made to the relevant Section in Part B.

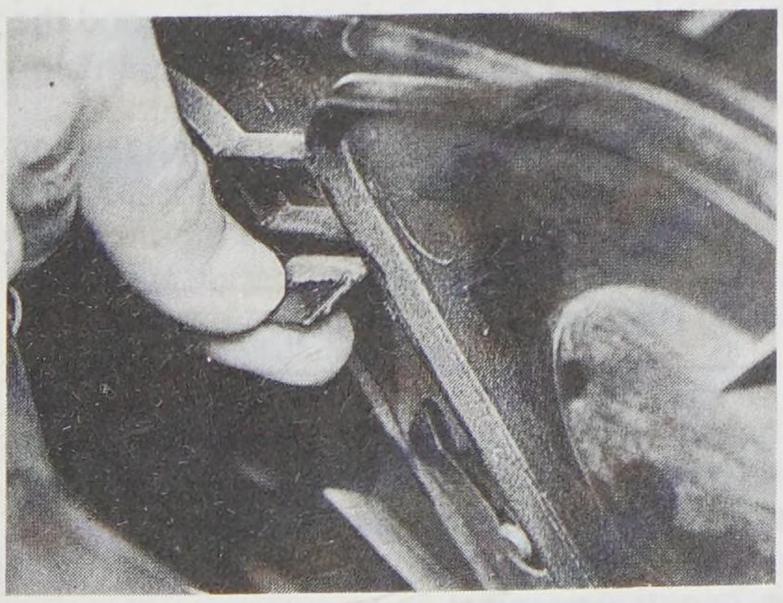
22 Maintenance and inspection

1 Refer to Section 2.

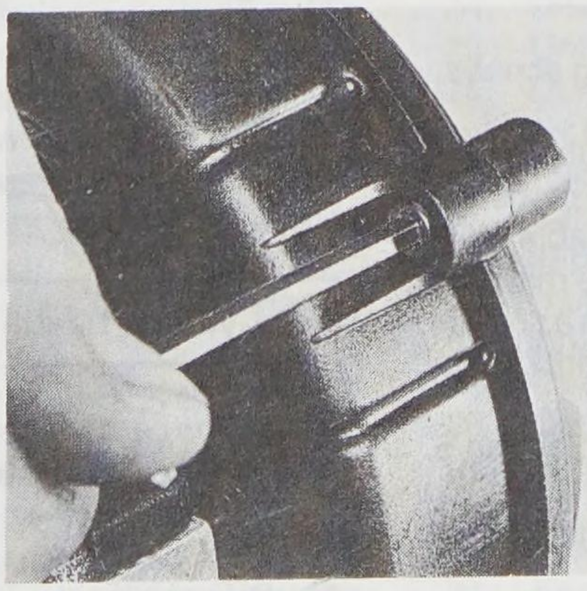
23 Camshaft drivebelt – renewal

Note: *Accurate adjustment of the camshaft drivebelt requires the use of special belt tensioning tools. An approximate setting can be achieved using the method which follows, but it is strongly recommended that the belt tension is checked by a Peugeot dealer as soon as possible after completion. Belt life and increased running noise may otherwise be compromised.*

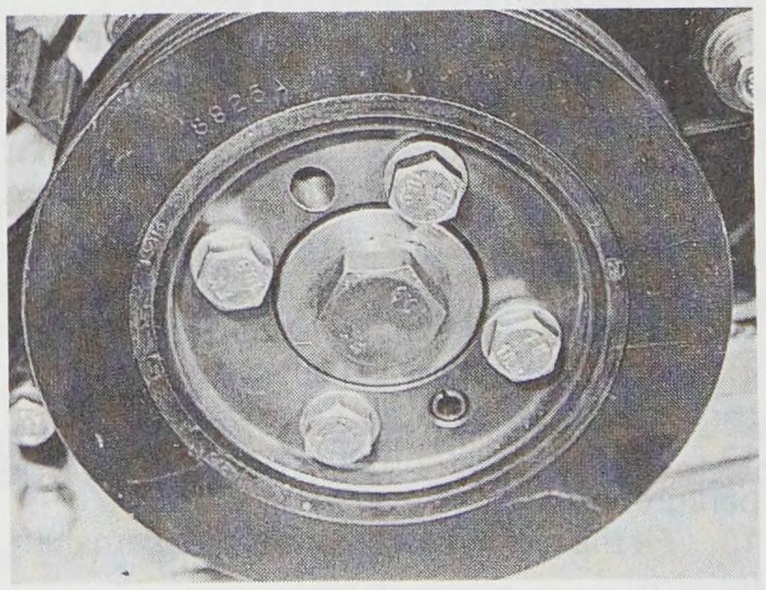
1 Disconnect the battery negative terminal.
2 Raise the front of the vehicle onto axle stands, remove the front right-hand roadwheel and the wheel arch liners to gain access to the crankshaft pulley and camshaft drivebelt lower covers.
3 Remove the alternator drivebelt as described in Chapter 12.
4 Undo the quick release clips from the camshaft drivebelt cover (photo).
5 Remove the upper cover securing screws and withdraw the cover (photo).
6 Using a spanner on the crankshaft pulley centre bolt, turn the engine until the slot in the crankshaft sprocket is lined up with the timing hole in the front oil seal carrier and the timing holes in the two camshaft sprockets are lined up with the holes in the backplate.



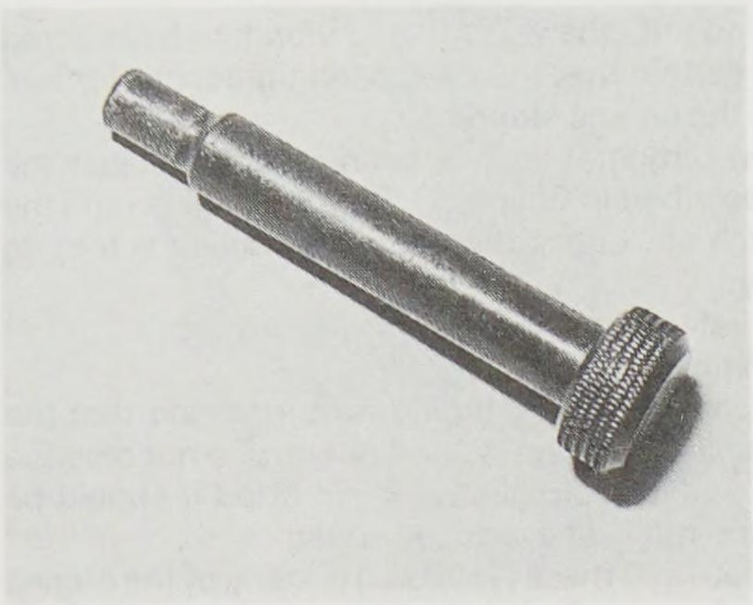
23.4 Undoing a drivebelt cover quick release clip



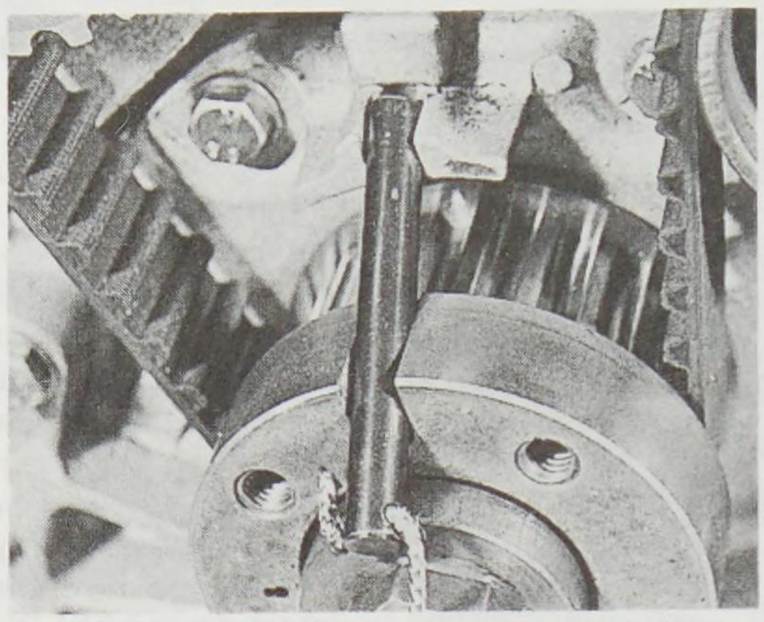
23.5 Removing a camshaft drivebelt cover screw



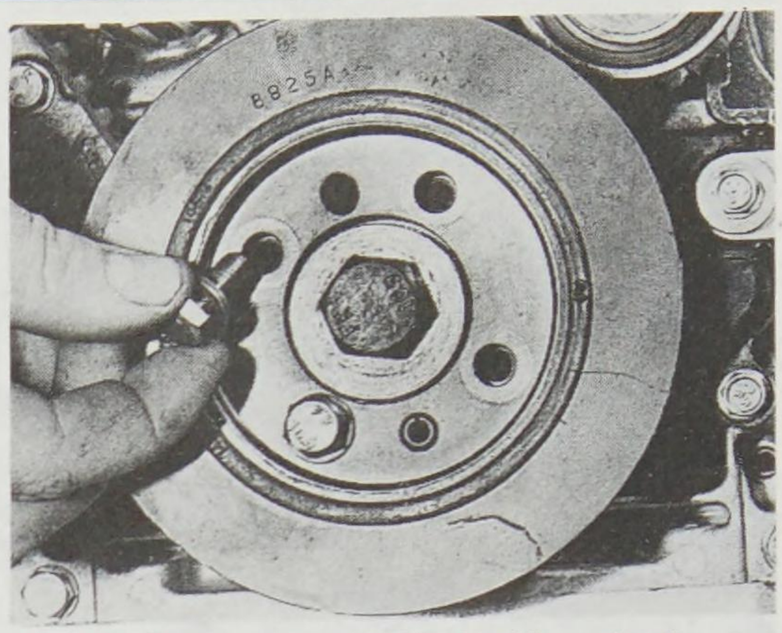
23.7 Crankshaft pulley/damper bolts



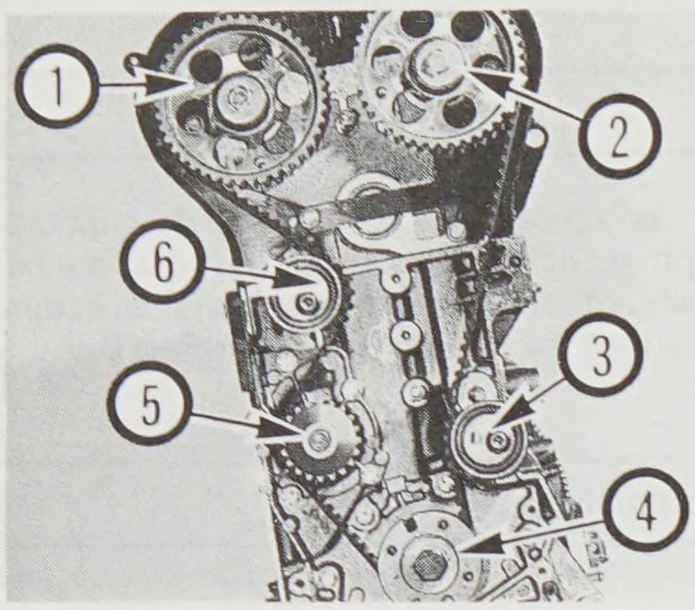
23.11 Camshaft sprocket locking pin



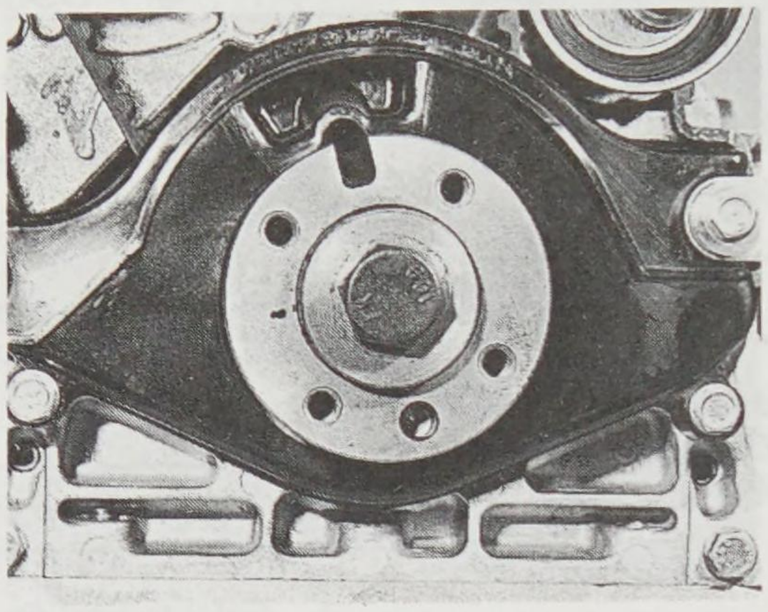
23.13A Crankshaft sprocket locking pin in position



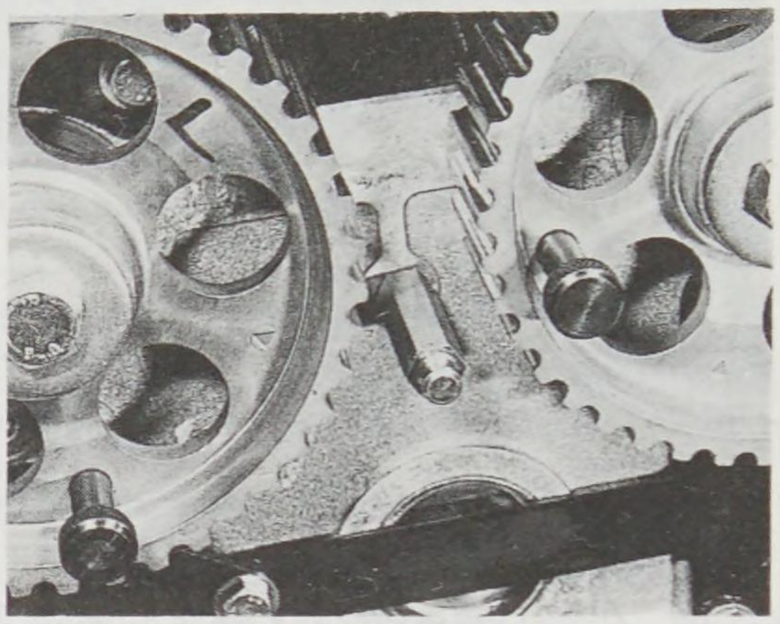
23.13B Camshaft sprocket locking pins in position



23.14 Sequence of fitting the timing belt in a clockwise direction starting from number 1



23.21A Camshaft drivebelt lower cover in position



23.21B Fitting a bolt to the crankshaft pulley/damper

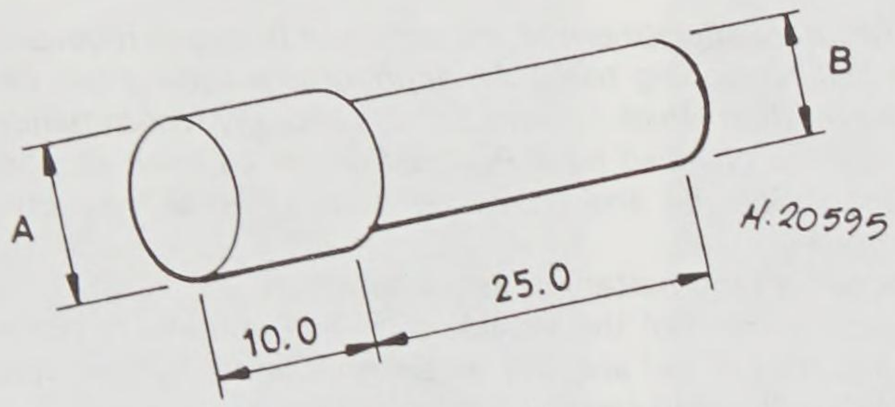


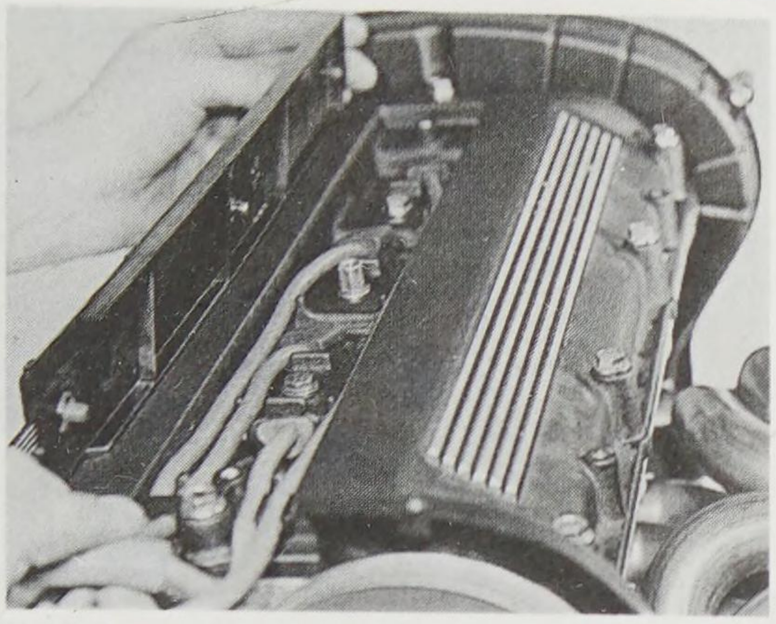
Fig 1.15 Camshaft locking pin fabrication dimensions (Sec 23)

a = 8.43 mm diameter
b = 6.38 mm diameter
All dimensions in mm

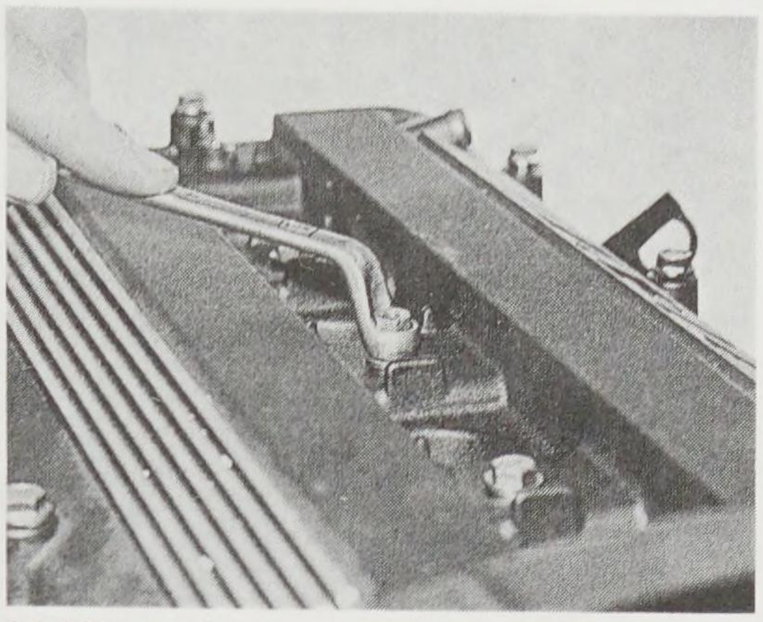
7 Remove the bolts from the crankshaft pulley/damper and withdraw the pulley from the crankshaft (photo).
8 Remove the camshaft drivebelt lower cover.
9 Using an Allen key, release the belt tensioner roller locking screws.
10 Remove the camshaft drivebelt.
11 In order to lock the crankshaft and both camshafts in the timed position, it is necessary to insert locking pins through the camshaft sprockets and the crankshaft sprocket. These pins are available from Peugeot dealers, but in their absence, the camshaft pins can be made up with reference to Fig. 1.15. A short length of dowelling which is a snug fit in the crankshaft sprocket cut-out and the timing hole in the front oil seal carrier will suffice for the crankshaft (photo).
12 For general comments on drivebelt inspection, refer to Section 5, paragraph 1.
13 Fit the locking pins through the camshaft and crankshaft sprockets (photos).
14 Fit the camshaft drivebelt in the sequence shown in the photograph, working clockwise from the exhaust camshaft. It is important that this sequence is followed (photo).
15 Settle the belt in position, then adjust as follows.
16 Tension both rollers so that the belt is taut but can be twisted through 45°, using moderate pressure with the finger and thumb mid-way along the belt's longest run (ie, between the exhaust camshaft sprocket and the right-hand idler roller). Tighten the idler roller locknuts.
17 Remove the three locking pins.
18 Turn the engine through two complete revolutions, then reinsert the crankshaft locking pin.
19 With the engine locked in this position, the two camshaft pins should slide easily into position through the camshaft sprockets and enter the holes in the cylinder head. If this is not the case, the belt must be released and repositioned if necessary and the tensioner rollers re-tensioned to achieve perfect alignment of the locking pins.
Note: *It is not easy to obtain the required degree of accuracy here, but with care and patience it can be done. It should also be remembered that any misalignment will affect valve timing and thus engine performance.*
20 Satisfactory alignment is only achieved when the locking pins can be inserted easily in all three positions after the engine has been turned through two complete revolutions.
21 Fit the camshaft drivebelt lower cover, crankshaft pulley and the upper covers (photos).
22 The remaining procedure is a reversal of removal.
23 You are again reminded that it is prudent to have the belt tension checked by your Peugeot dealer.

24 Cylinder head – removal and refitting

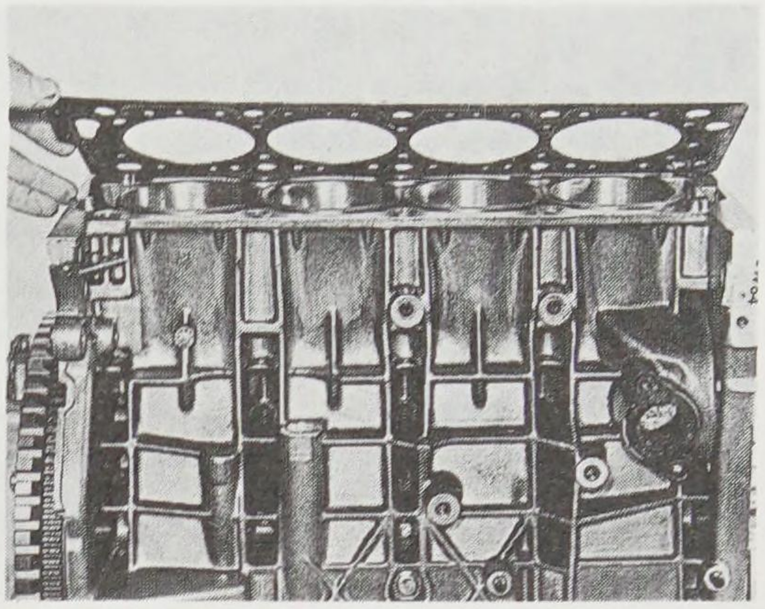
Note: *The camshafts can be removed leaving the cylinder head in situ, or they can be left in place and removed after the cylinder head is lifted off. The procedure given here describes their removal with head in situ, the head being removed afterward.*
1 Disconnect the battery negative terminal.
2 Drain the cooling system as described in Chapter 2.
3 Remove the camshaft drivebelt as described in Section 23.
4 Remove the cover plate from between the camshaft cover (photo).



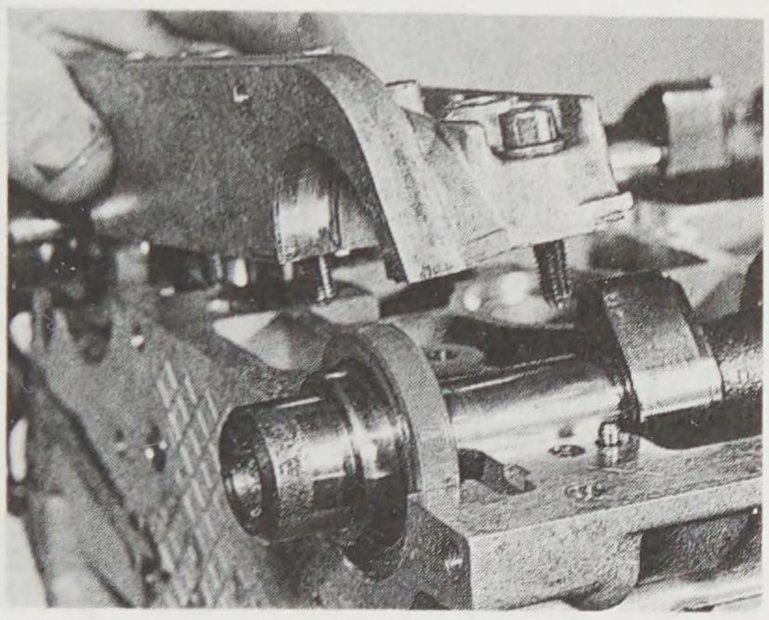
24.4 Removing the cover plate from between the two camshaft covers



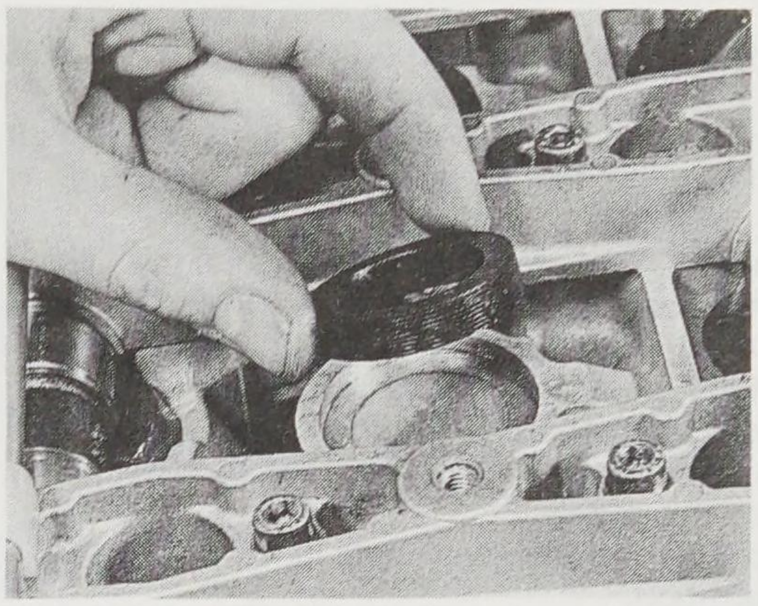
24.8 Removing a camshaft cover bolt



24.32 Fitting a new cylinder head gasket



24.38 Fitting a camshaft bearing cap



24.41 Fitting a spark plug hole oil seal

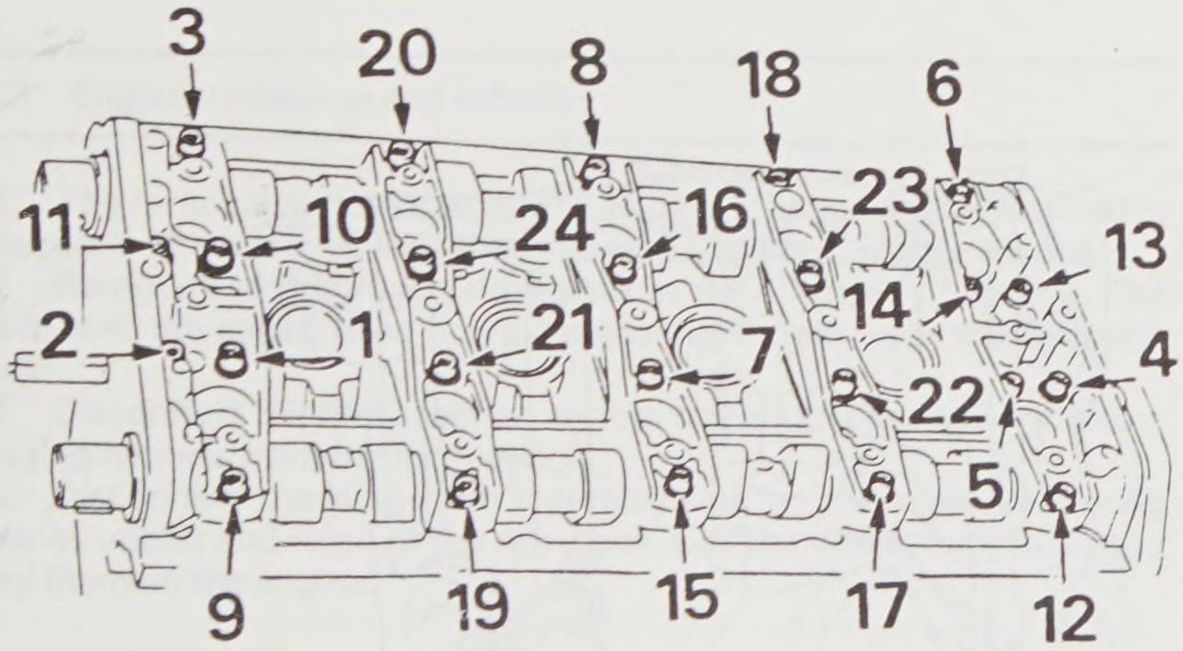
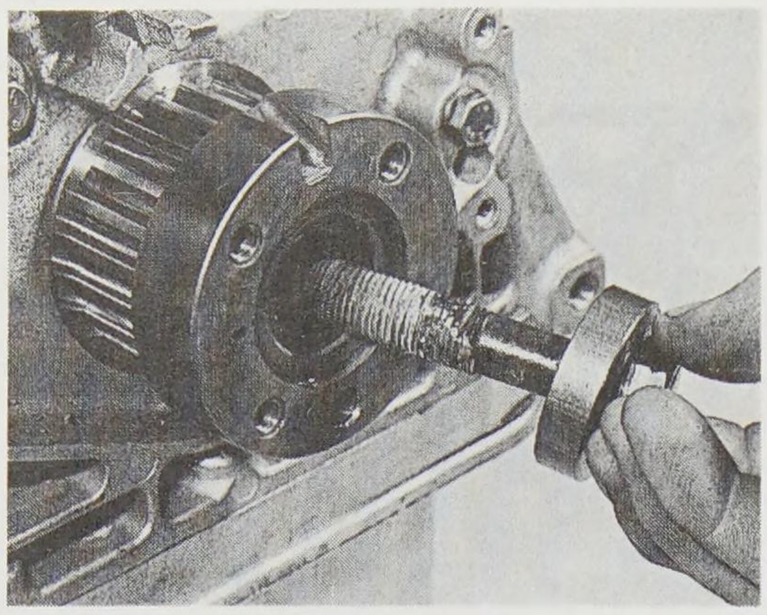
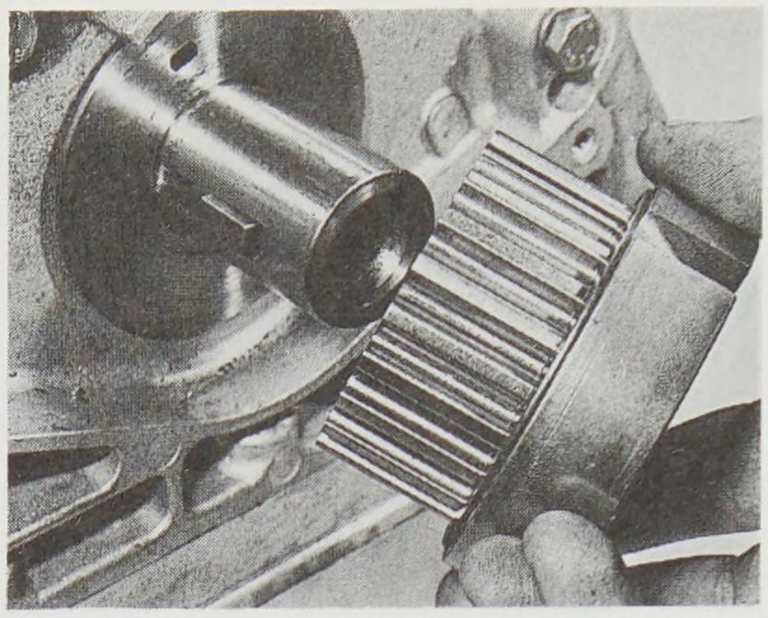


Fig 1.16 Camshaft bearing cap bolt tightening sequence (Sec 24)

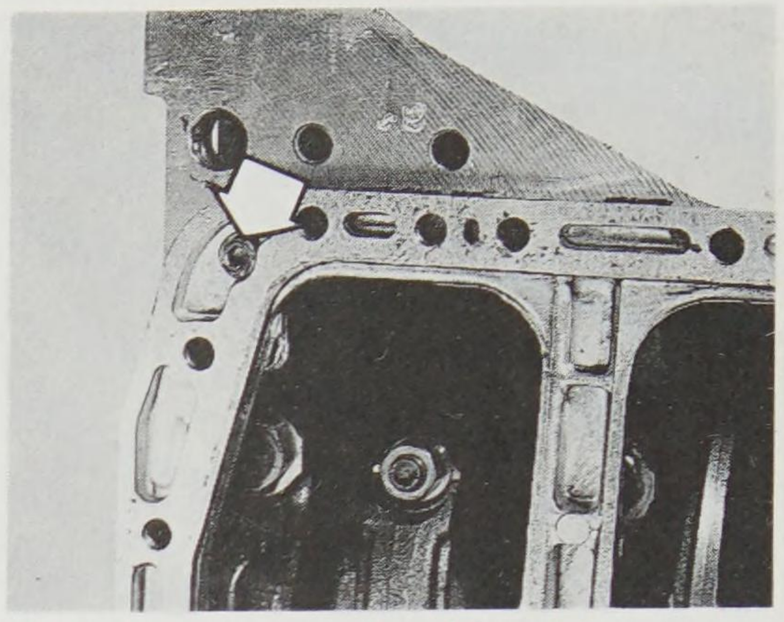
5 Disconnect the HT leads from the spark plugs, then remove the distributor cap and leads.
6 Unbolt and remove the fuel rail, and injectors laying the assembly to one side (see Chapter 3).
7 Disconnect the coolant hoses from the cylinder head.
8 Unbolt and remove the camshaft cover, noting any pipe/hose brackets under the rear bolts (photo).
9 Pull the camshaft lubrication galleries from the camshaft bearing caps.
10 Remove the power steering pump drivebelt. (Chapter 10, Section 12).
11 Using an open-ended spanner on the flats machined in the camshaft to prevent rotation, undo the power steering pump pulley bolt and remove the pulley. Unbolt and remove the half cover behind the pump.
12 Remove the distributor rotor, rotor drive and sealing plate from the end of the inlet valve camshaft (Chapter 4, Section 3).
13 Disconnect the coolant temperature switches on the thermostat housing.
14 Using a spanner on the machined flats of the camshafts to prevent them turning, undo and remove the camshaft sprockets and recover the Woodruff keys.
15 Note that the camshaft bearing caps are numbered 1 to 5 from the flywheel end of the engine and are dowelled so that they can only be fitted one way.
16 Progressively unscrew the Allen bolts securing the caps to the cylinder head in the reverse order shown in Fig. 1.16, then remove caps number 4 and 2, then 3 and 1 and finally number 5, in that order.
17 Lift out the camshafts, labelling them 'inlet' and 'exhaust' although for identification the inlet camshaft has a keyway in its end for the distributor drive.
18 Disconnect the air inlet ducting from the air filter.
19 Disconnect the accelerator cable from the throttle housing and inlet manifold.
20 Disconnect the throttle switch unit and idle speed regulator.
21 Unbolt the oil filler tube.
22 Remove the inlet manifold.
23 Unclamp the power steering hoses from the brackets above the exhaust manifold.
24 Disconnect the exhaust downpipe from the exhaust manifold.
25 Unbolt and remove the exhaust manifold.
26 Using a number 55 Torx drive bit, unscrew and remove the cylinder head bolts in reverse order to that shown in Fig. 1.6, noting the thickness of the distance pieces under each bolt.
27 Carefully remove the cylinder head, with reference to Section 7, paragraphs 17 to 21. Remove the hydraulic tappets from the cylinder head, keeping them in order – they must all be refitted in their original positions, if not being renewed.
28 Overhaul of the cylinder head is described in Section 30.
29 Commence refitting by ensuring the cylinder head face and that of the cylinder block are perfectly clean and free from all traces of old gasket.
30 If fitted, remove the liner clamps.
31 Ensure the cylinder head locating dowels are in position in the cylinder block.
32 Fit a new cylinder head gasket to the block, over the locating dowels. The identification tab goes toward the flywheel end (photo).



27.2 Removing the crankshaft sprocket retaining bolt and spacer



27.3 Removing the crankshaft sprocket and spacer



27.4A Sump spacer plate Allen screw (arrowed)

33 Lower the cylinder head gently onto the cylinder block and over the locating dowels.
34 Coat the threads and underside of the cylinder head bolts with Molycote G Rapid Plus. Fit the distance pieces to the correct bolt as noted previously.
35 Fit and tighten the bolts, in two stages to the specified torque and angle setting (see Specifications) in the order shown in Fig. 1.6. For further information on cylinder head tightening using the angle tightening method, refer to Section 7, paragraphs 27 to 30 inclusive.
36 Lubricate the hydraulic tappets and insert them into their original locations. Oil the camshaft journals in the cylinder head then gently lay the camshaft in position on the journals.
37 Position the camshaft sprocket keyway slots in the camshafts at approximately 3 o'clock position.
38 Fit number 2 and 4 bearing caps but do not tighten their bolts. Apply sealant to the joint face of number 1 and 5 caps then fit caps number 5, 1 and 3, in that order (photo).
39 Fit and tighten all the cap bolts to the specified torque in the order shown in Fig. 1.16.
40 Using the method shown in Section 6, paragraph 26, fit new camshaft oil seals to both ends of the camshafts.
41 Fit new oil seals to the spark plug holes in the cylinder head before fitting the camshaft cover (photo).
42 The remaining procedure is a reversal of removal, using new gaskets where fitted and tightening all bolts to the specified torque. Fit the camshaft drivebelt as described in Section 23.

25 Valve clearances – checking and adjusting

1 No adjustment is required, the tappets being hydraulic and adjusting automatically to the required clearance.
2 As this automatic adjustment depends on the tappet pistons being filled with oil, there may be considerable tappet noise on start-up after the tappets have been removed during overhaul, until the oil chambers in the tappet and tappet piston fill with oil.

26 Sump – removal and refitting

The procedure is as described in Section 10.

27 Oil pump – removal, overhaul and refitting

Note: *As removal of the oil pump requires the camshaft drivebelt to be removed, it is advisable to read the procedure for camshaft drivebelt removal and refitting (Section 23) before starting work*
1 Remove the camshaft drivebelt (Sec 23) and the sump (Sec 26).
2 Wedge a suitable block between one of the crankshaft counterweights and the side of the crankcase to prevent crankshaft rotation, then undo and remove the crankshaft sprocket retaining bolt and spacer from the front end of the crankshaft (photo).
3 Pull off the crankshaft sprocket and spacer then remove the Woodruff key from the crankshaft (photo).
4 Undo the Allen screws and remove the sump spacer plate (photos).
5 Undo the bolts and remove the front oil seal carrier plate.
6 Undo the bolts and withdraw the oil pump, at the same time sliding the drive chain and sprocket off the crankshaft. Recover the adjustment shim between the pump and crankcase (photos).
7 Refer to Section 11, paragraphs 7 to 10 for oil pump inspection and repair procedures.
8 Before refitting the pump, renew the oil seal in the carrier plate and, if a new pump is being fitted, prime the unit by filling it with engine oil.
9 Refitting is a reversal of removal, but observe the following points.
10 Fit the centralising bolt ('5' in Fig. 1.17) first, to position the pump, then fit the remaining bolts. Do not forget the spacer plate.
11 Use silicone type instant gasket applied to clean surfaces to seal the sump spacer plate to the crankcase (photo).
12 Refit the sump and camshaft drivebelt as described in Sections 26 and 23 respectively.

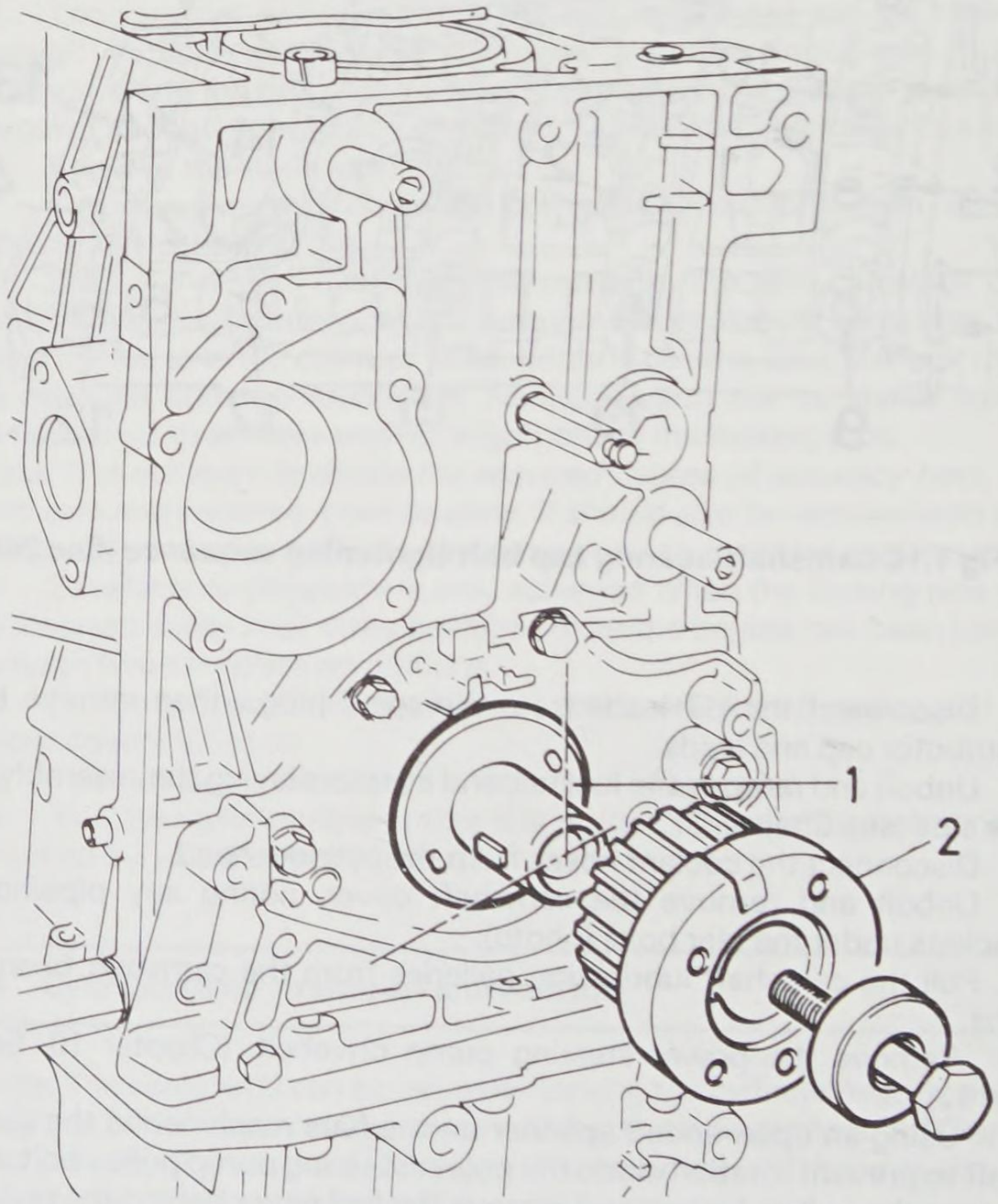
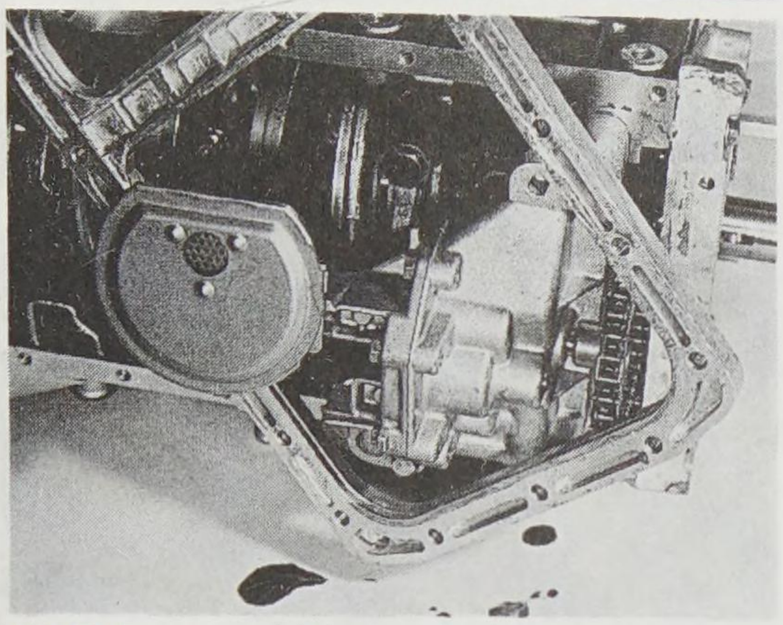
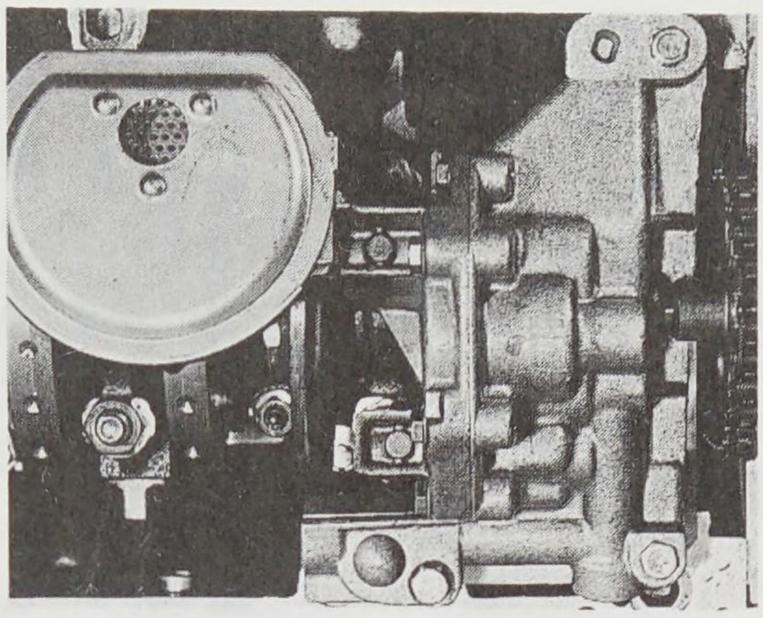


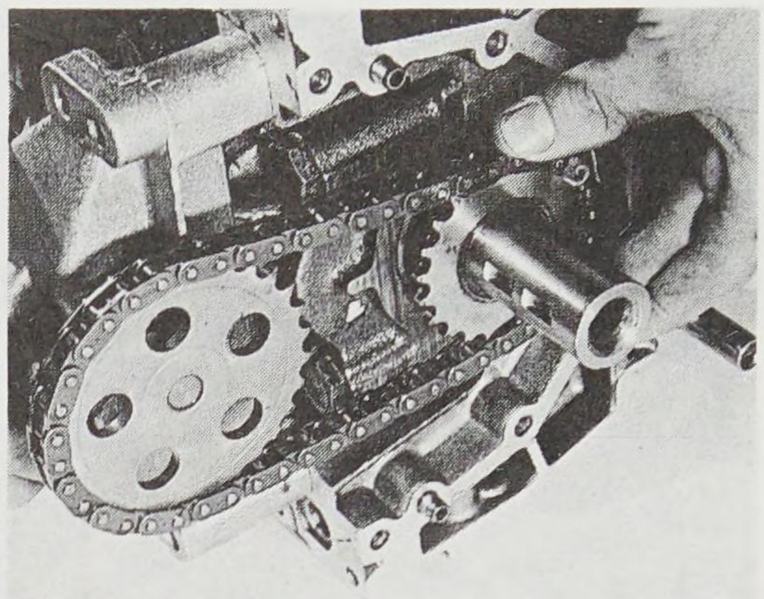
Fig 1.17 Crankshaft spacer (1) behind crankshaft sprocket (2) (Sec 27)



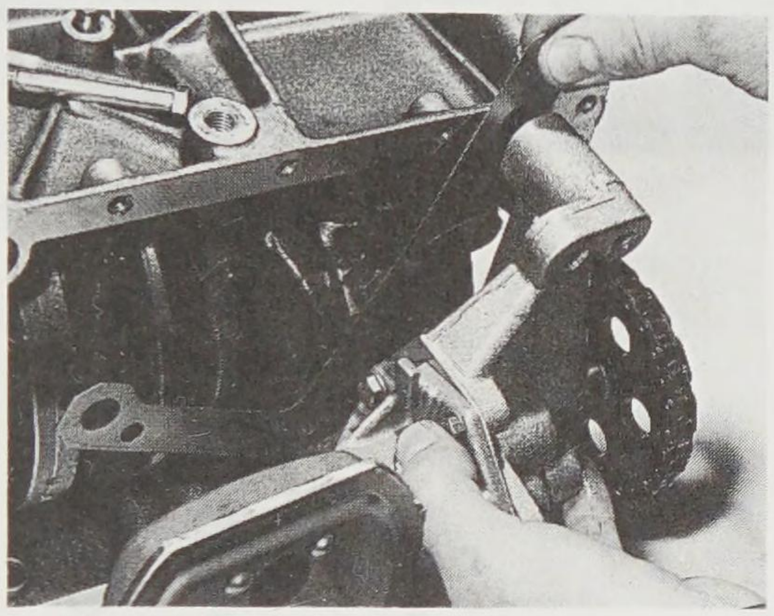
27.4B Removing the sump spacer plate



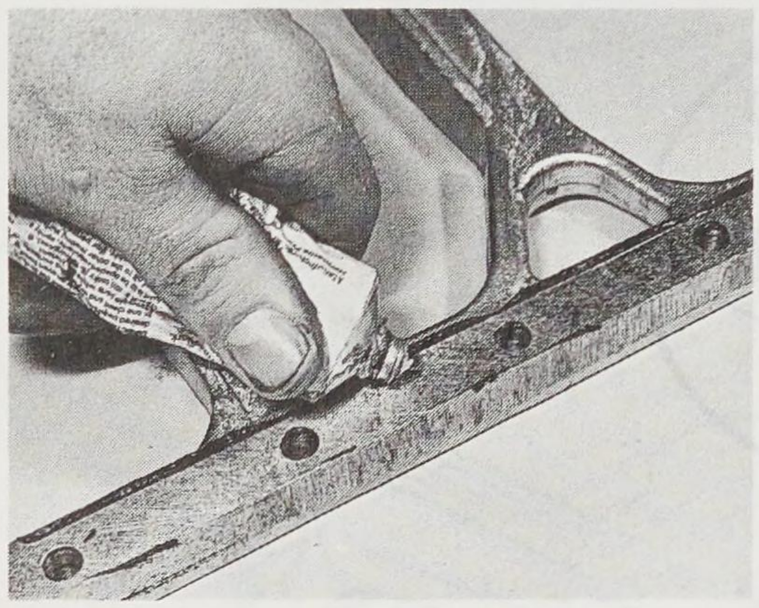
27.6A Oil pump and retaining bolts



27.6B Removing the oil pump with chain and drive sprocket



27.6C Oil pump adjustment shim



27.11 Applying gasket cement to the sump spacer plate

28 Engine – removal and refitting

1 The removal and refitting of the engine is basically as described in Sections 12 and 18, bearing the following additional points in mind.
2 Remove the right-hand driveshaft as described in Chapter 7. The left-hand driveshaft need only be disconnected from the transmission unit.
3 Disconnect the fuel injection control unit multi-plug and unclip the wiring harness from the inner wing.
4 Disconnect the plug from the relay unit on the right-hand wing panel, unbolt and remove the relay box. Coil the wiring harnesses and lay them on the engine.

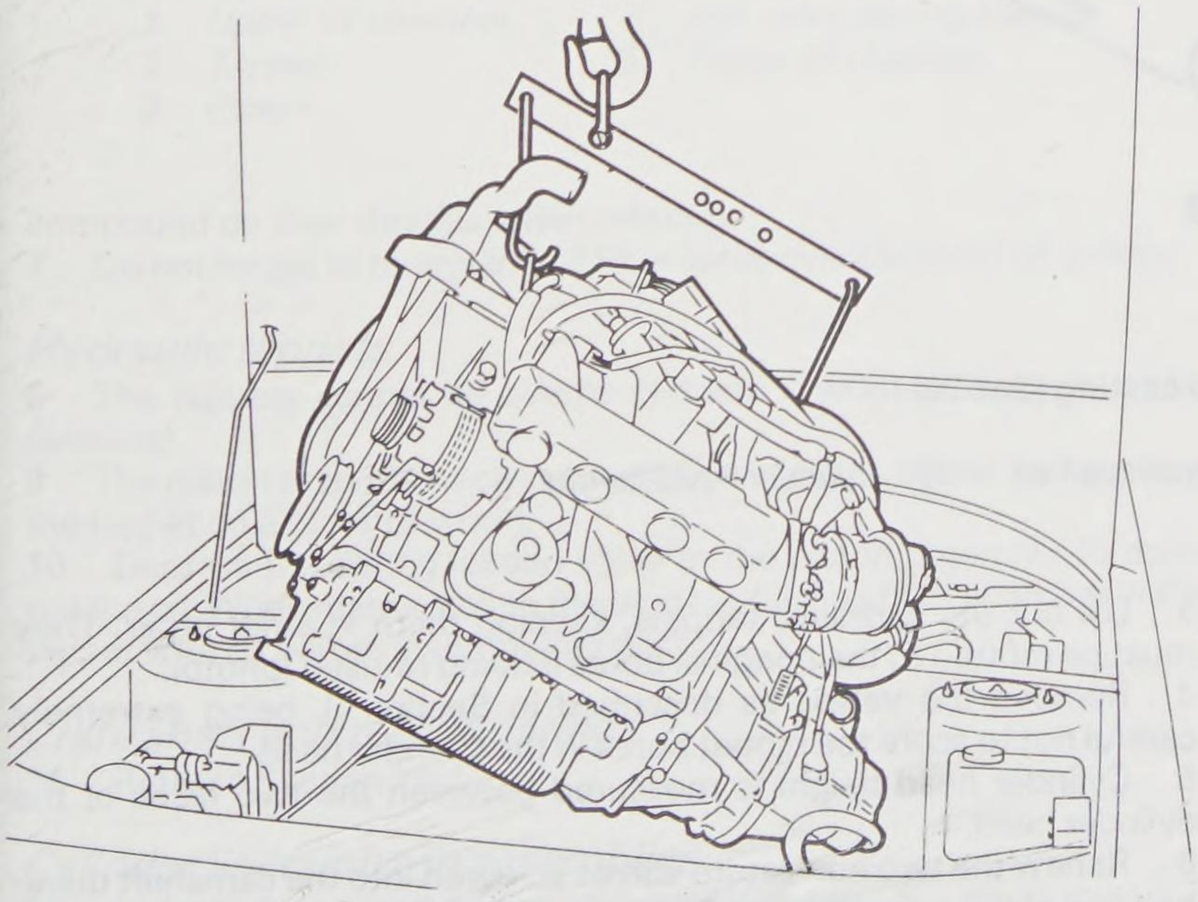
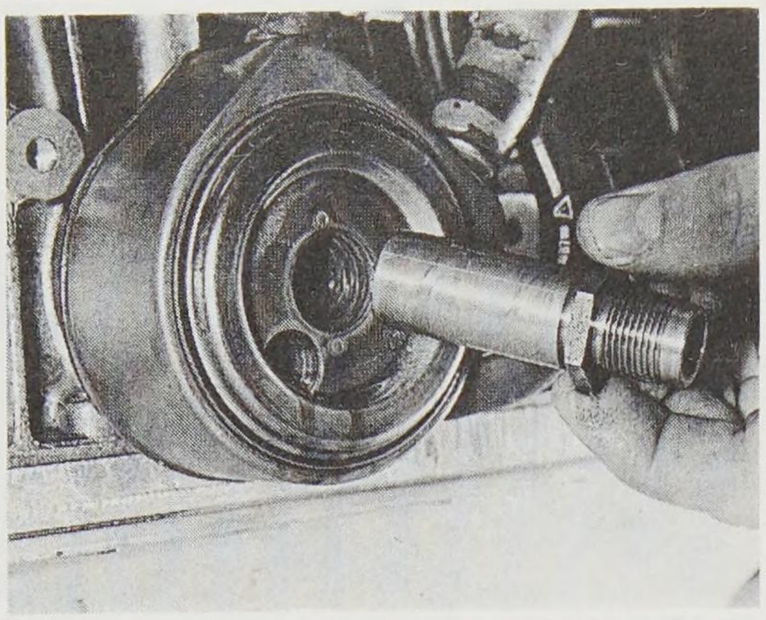


Fig 1.18 Lifting out the engine (Sec 28)

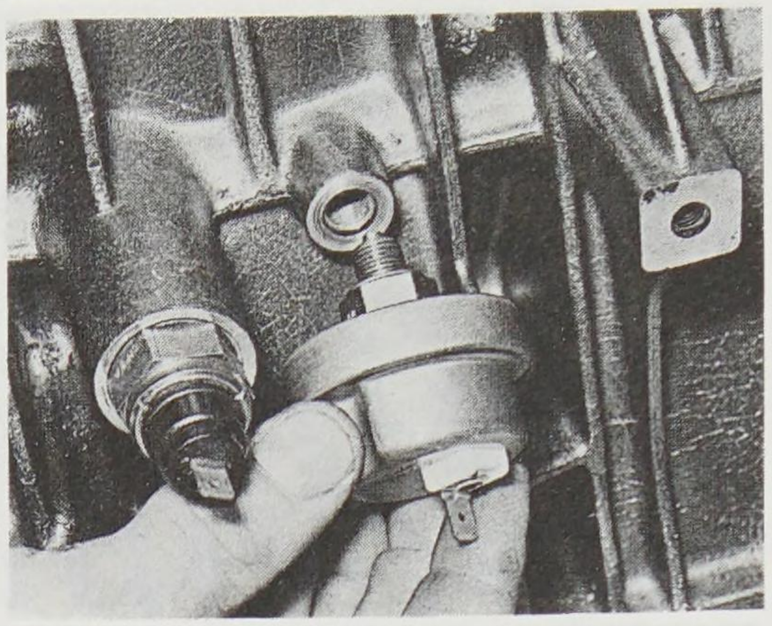
5 Remove the power steering pump drivebelt, unbolt the power steering pump, unclamp the hoses from above the exhaust manifold and tie the pump and hoses out of the way. There should be no need to disconnect any hoses.
6 Drain the cooling system and remove the radiator (Chapter 2).
7 Where fitted, after removing the alternator drivebelt, unbolt the air conditioning compressor and tie it to one side. DO NOT disconnect any air conditioning hoses unless the system has been de-pressurised by a dealer.
8 Attach lifting gear to the engine and just take the engine weight.
9 Remove the left-hand engine mounting from the transmission unit.
10 Position a trolley-jack under the transmission and just take the weight.
11 The left-hand lifting chain must now be lengthened so that the engine will tilt, transmission end down, when it is lifted.
12 With the lifting gear just taking the weight of the engine, remove the right-hand engine mounting.
13 Remove the battery tray (Chapter 11).
14 Raise the engine and lift it clear of the vehicle.
15 Refitting is a reversal of removal, with reference to Sections 18 and 20.

29 Engine – dismantling

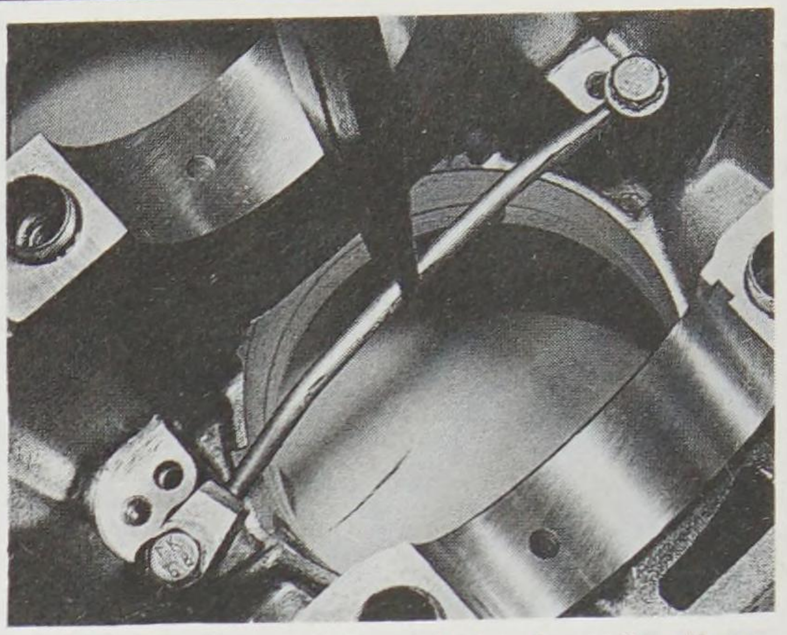
1 Dismantling of the engine is basically as described in Section 14, with reference to Section 24 for cylinder head removal, and additionally as follows.
2 Remove the oil filter, then unscrew the oil cooler adaptor and remove the oil cooler (photo).
3 Unscrew the oil pressure sensor mounted by the oil pressure switch (photo).
4 After removing the sump, unbolt and remove the sump spacer plate.
5 Removal of the oil pump is as described in Section 27.
6 After removing the crankshaft, unbolt and remove the piston lubrication oil galleries from the crankcase (photo).



29.2 Unscrewing the oil cooler adaptor



29.3 Removing the oil pressure sensor



29.6 Removing a piston lubrication oil gallery

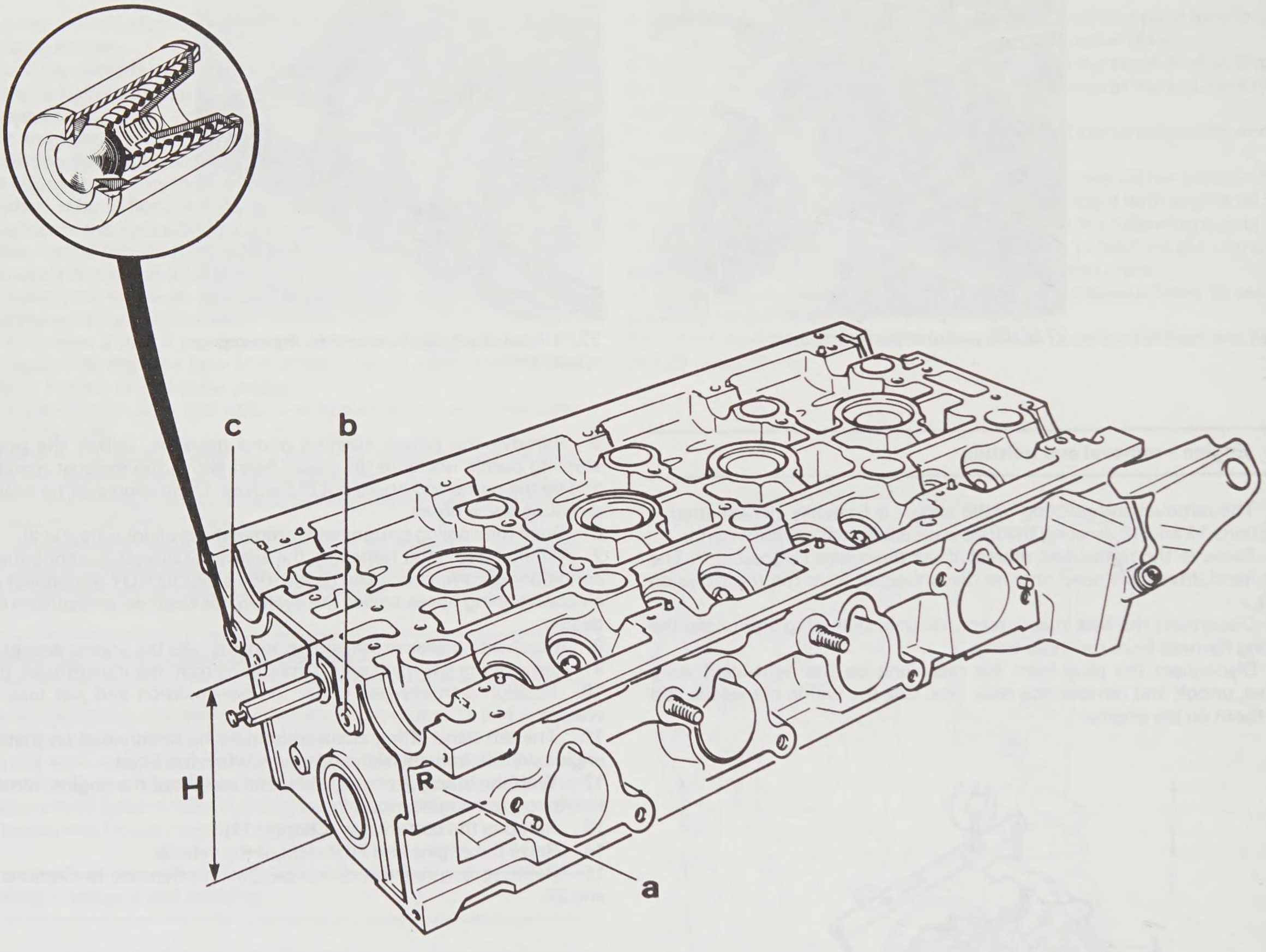


Fig 1.19 Cylinder head casting (Sec 30)

a Machining identification mark R b and c Non-return valves H Cylinder head height

30 Engine components – inspection and overhaul

1 Inspection and overhaul of the engine components is as described in Section 8 for the cylinder head and Section 16 for the remaining components, taking note of the following.

Cylinder head

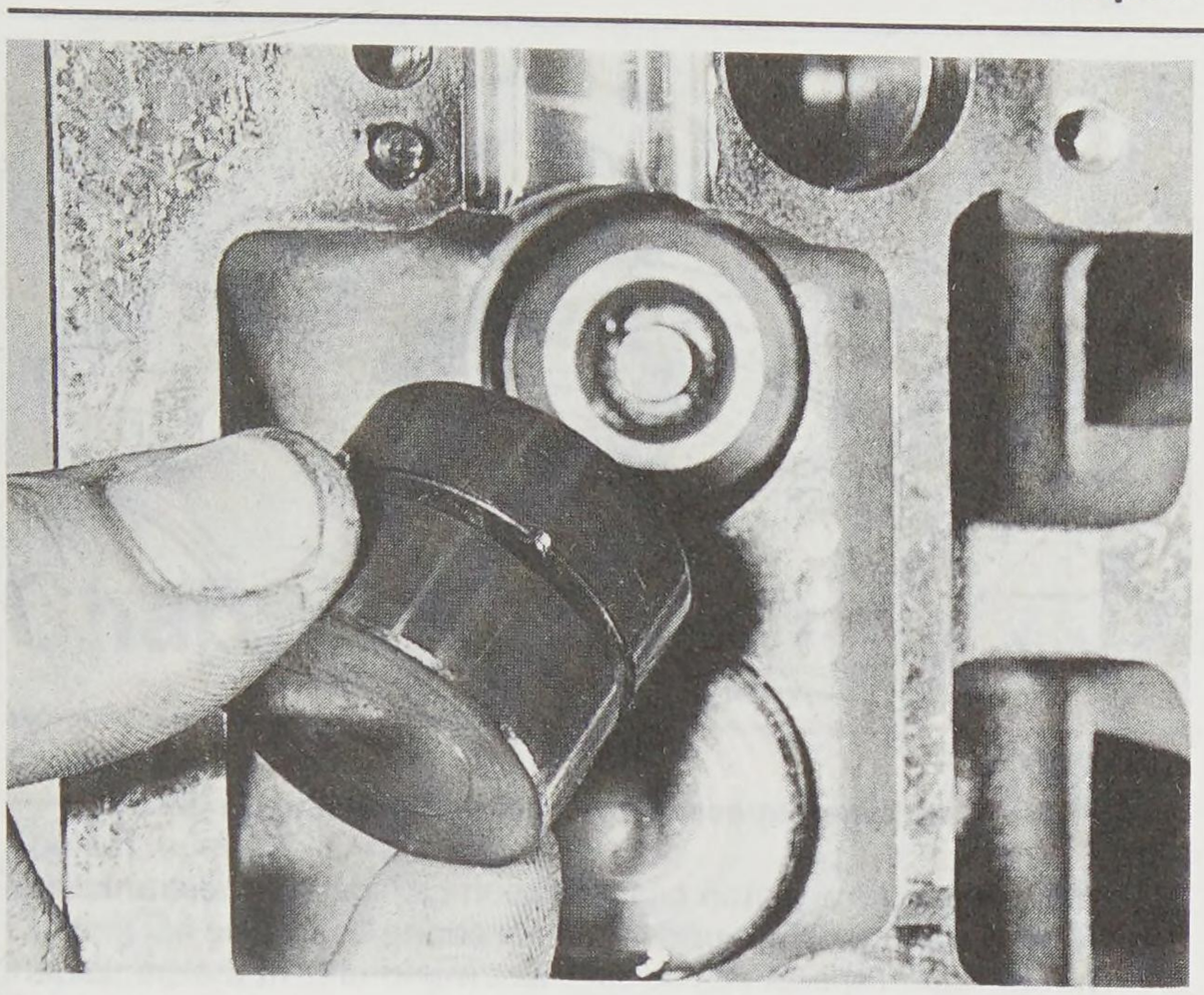
2 If still fitted, remove the spark plug seals and spark plugs.

3 Lift out the hydraulic tappets, keeping them in strict order. They must be refitted to their original bores if being re-used (photo).

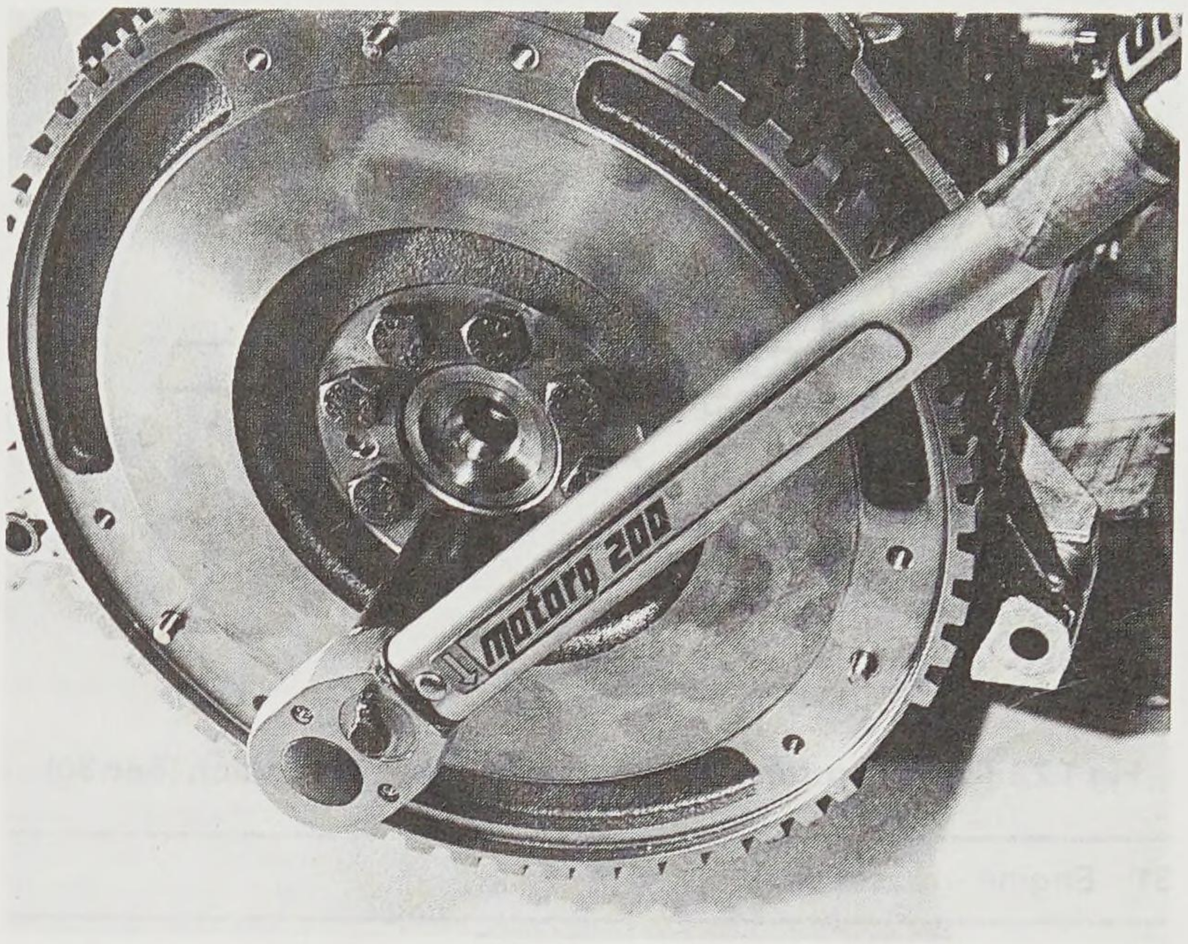
4 Remove the valves as described in Section 8, being extremely careful not to score the tappet bores in the cylinder head.

5 Cylinder head height is measured between the two faces of the cylinder head.

6 Renew the two non-return valves screwed into the camshaft drive-belt end of the cylinder head. The valves are fitted to maintain a residual oil pressure in the hydraulic tappet oil supply. Use thread-locking



30.3 Lifting out a hydraulic tappet



30.15 Tightening a flywheel bolt note the toothed rotor

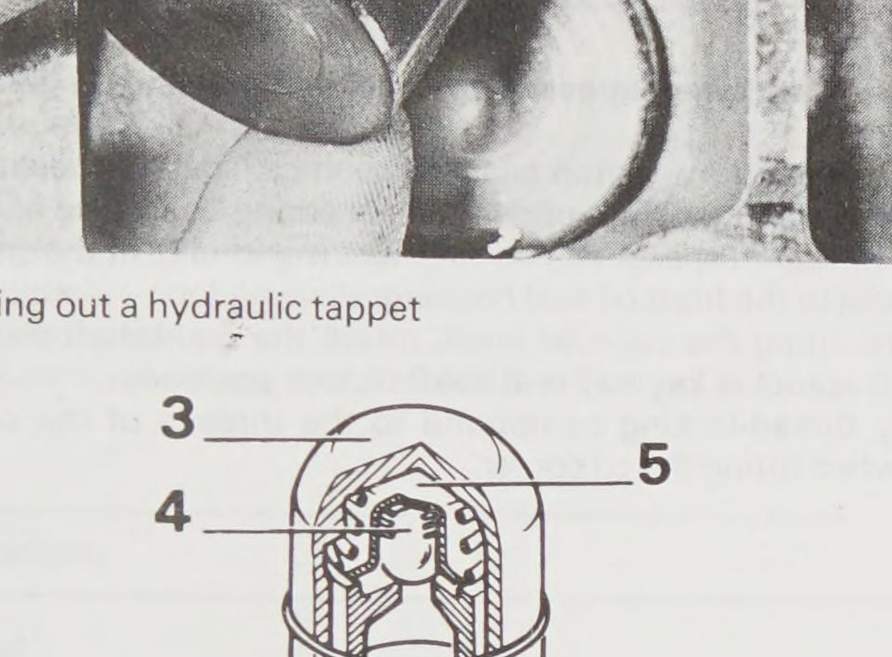


Fig 1.20 Tappet and hydraulic piston assembly (Sec 30)

1 Upper oil chamber
2 Tappet
3 Piston
4 Ball valve (spring-loaded)
5 Piston oil chamber

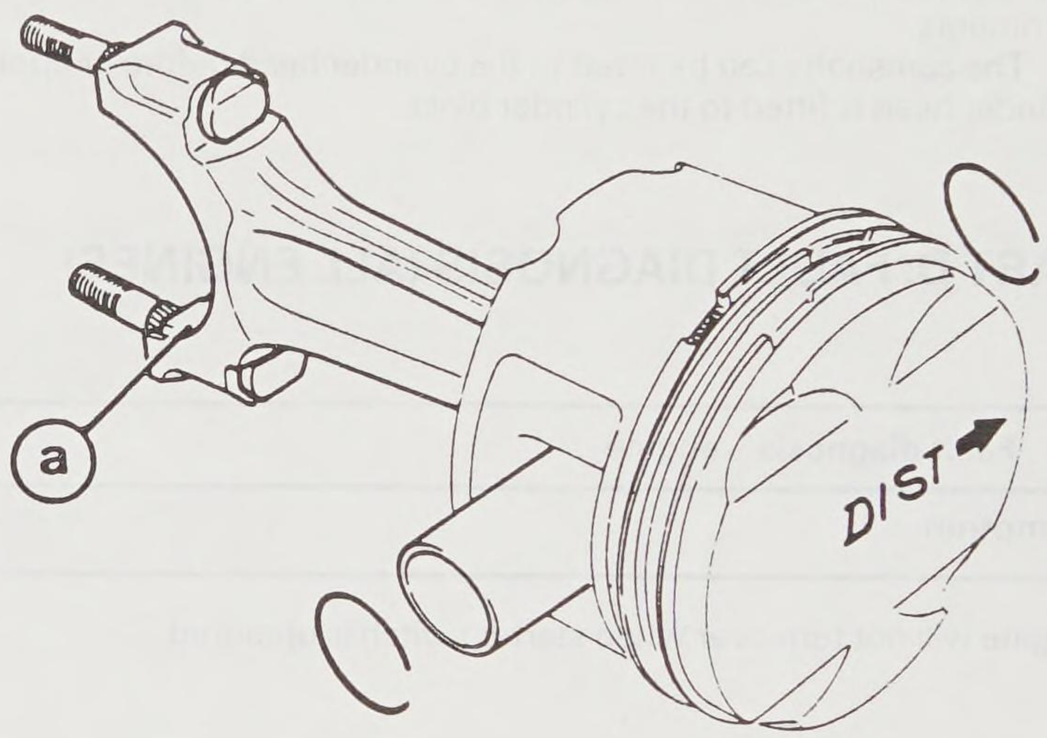


Fig 1.21 Piston and connecting rod assembly (Sec 30)

a Bearing shell notch

compound on their threads when refitting.
7 Do not forget to renew the oil filter in the cylinder head oil gallery.

Hydraulic tappets

8 The tappets cannot be overhauled and if worn or noisy must be renewed.
9 The piston assemblies can be removed from the tappet by knocking the tappet on a block of wood.
10 Depress the spring-loaded valve in the piston assembly to drain out the oil. When reassembling the tappets, fill the upper chamber in the tappet with oil before inserting the piston.

Crankshaft and main bearings

11 Refer to Section 16.

Cylinder liners/piston assemblies

12 Refer to Section 16, noting also the following.
13 The piston can be separated from the connecting rod by extracting the circlips from the ends of the gudgeon pin and pushing the gudgeon pin from the piston and connecting rod.

14 On reassembly, ensure that the arrow on the piston crown faces toward the camshaft drivebelt end of the engine. The gaps in the gudgeon pin circlips must face upward toward the piston crown and the bearing shell notches in the connecting rod must be nearest the flywheel end.

Flywheel/toothed rotor

15 On later models, the toothed rotor on the flywheel has been reduced in diameter by 1.8 mm (0.07 in) from 286.0 mm (11.27 in) to 284.2 mm (11.19 in) (photo).
16 To maintain the correct air gap between the TDC/engine speed sensor and the rotor, the sensor mounting flange has been reduced by 0.9 mm (0.35 in).
17 If a new clutch housing is being fitted to an engine with an earlier type toothed rotor, a 0.9 mm spacer must be fitted between the sensor and clutch housing.
18 As a check on which components are fitted, use a depth gauge to measure the distance between the sensor mounting flange and the tip of a rotor tooth.
19 If the reading is 25.0 mm (1.0 in), no shim is fitted under the sensor. If the reading is 24.1 mm (0.95 in) a shim must be fitted.

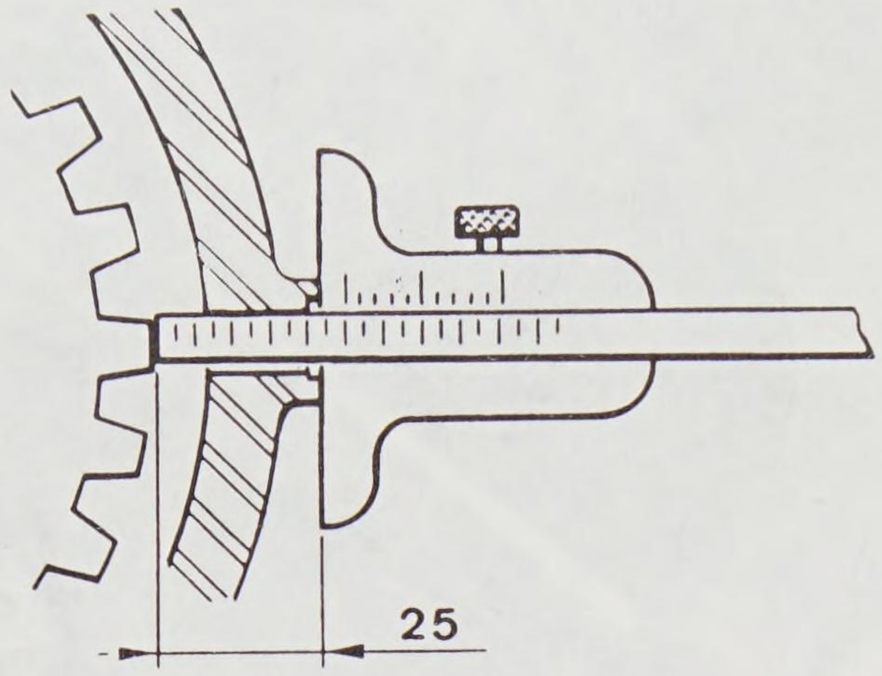


Fig 1.22 Toothed rotor/TDC sensor mounting dimension (Sec 30)

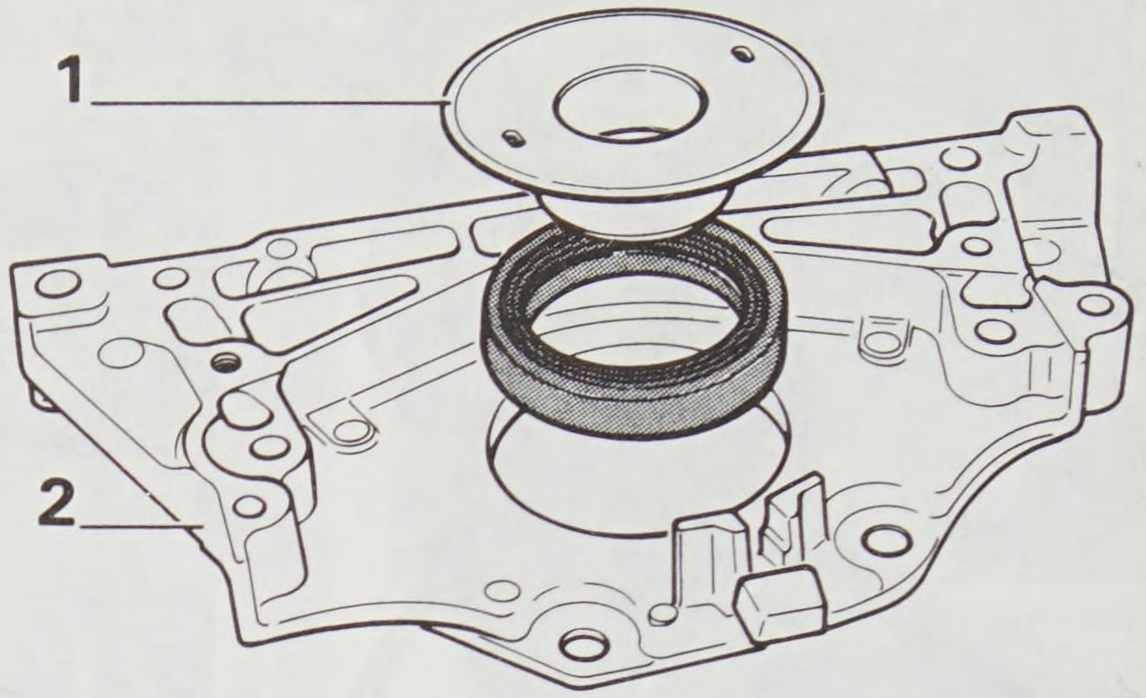


Fig 1.23 Crankshaft spacer (i), oil seal and housing (2) (Sec 31)

31 Engine – reassembly

1 Reassembly of the engine is as described in Section 18 and with reference to the relevant section(s) in this Part C. Note also the following comments.
2 The camshafts can be fitted to the cylinder head before or after the cylinder head is fitted to the cylinder block.
3 When refitting the piston oil lubrication galleries to the crankcase, apply thread-locking compound to their securing bolts.
4 The crankshaft spacer can be used as a mandrel to fit the crankshaft front oil seal to the front oil seal housing.
5 Before fitting the cylinder head, rotate the crankshaft so that the crankshaft sprocket keyway is at the 9 o'clock position.
6 Apply thread-locking compound to the threads of the oil cooler adaptor when fitting the oil cooler.

PART D: FAULT DIAGNOSIS (ALL ENGINES)

32 Fault diagnosis – engine

Symptom	Reason(s)
Engine will not turn over when starter switch is operated	Flat battery Bad battery connections Bad connections at solenoid switch and/or starter motor Starter motor jammed Defective solenoid Starter motor defective
Engine turns over normally but fails to fire and run	No sparks at plugs No fuel reaching engine Too much fuel reaching engine (flooding)
Engine starts but runs unevenly and misfires	Ignition and/or fuel system faults Incorrect valve clearance (where applicable) Burnt out valves Blown cylinder head gasket, dropped liners Worn out piston rings Worn cylinder bores
Lack of power	Ignition and/or fuel system faults Incorrect valve clearance (where applicable) Burnt out valves Blown cylinder head gasket Worn out piston rings Worn cylinder bores
Excessive oil consumption	Oil leaks from crankshaft oil seal, timing cover gasket and oil seal (where applicable), camshaft cover gasket, crankcase or gearbox joint (where applicable) Worn piston rings or cylinder bores resulting in oil being burnt by engine (smoky exhaust is an indication) Worn valve guides and/or defective valve stem oil seals
Excessive mechanical noise from engine	Incorrect valve clearance (where applicable) Worn crankshaft bearings Worn cylinders (piston slap) Slack or worn camshaft drivebelt and sprockets (where applicable) Worn oil pump drive chain or sprockets

Chapter 2 Cooling system

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Cooling fan and thermo-switch – removal, refitting and testing 9
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Radiator – removal and refitting 6
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Water distribution housing – removal and refitting 11
Water pump – removal and refitting 12

Specifications

General	
System type	Pressurised with front-mounted radiator, electric cooling fan(s), water pump and thermostat
System capacity	
All models except Mi 16	6.6 litres (11.6 pints)
Mi 16 models	7.2 litres (12.7 pints)
Radiator cap pressure setting	1.0 bar (14.5 lbf/in^2)
Thermostat	
Opens at	88°C (190°F)
Fully open at	100°C (212°F)
Electric cooling fan operating temperature (applies to all models without air conditioning)	
Up to 1989:	
1st speed on at	92°C (198°F)
2nd speed on at	97°C (207°F)
1st speed off at	88°C (190°F)
2nd speed off at	92°C (198°F)
1989-on:	
1st speed on at	96°C (205°F)
2nd speed on at	101°C (214°F)
1st speed off at	92°C (198°F)
2nd speed off at	97°C (207°F)
Antifreeze type/specification	Ethylene glycol based antifreeze – Napgel 2000/1 (Duckhams Universal Antifreeze and Summer Coolant)

Torque wrench setting

	Nm	lbf ft
Water pump bolts	15	11

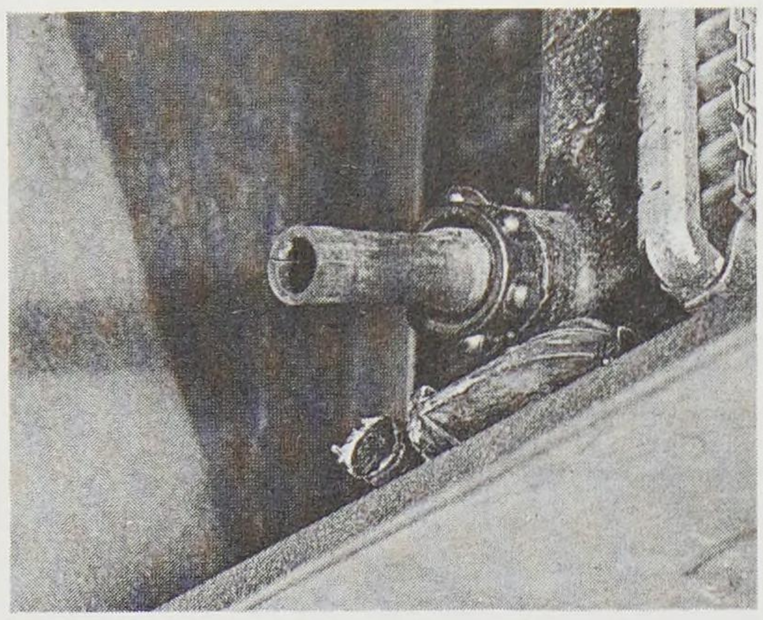
1 General description

The cooling system is of the pressurised type having a front-mounted radiator incorporating a de-aeration/filler tank. There is no separate expansion tank. A thermal switch, screwed into the radiator, controls the operation of the cooling fan which is mounted in front of the radiator behind the radiator grille. On some models a double fan arrangement is used.

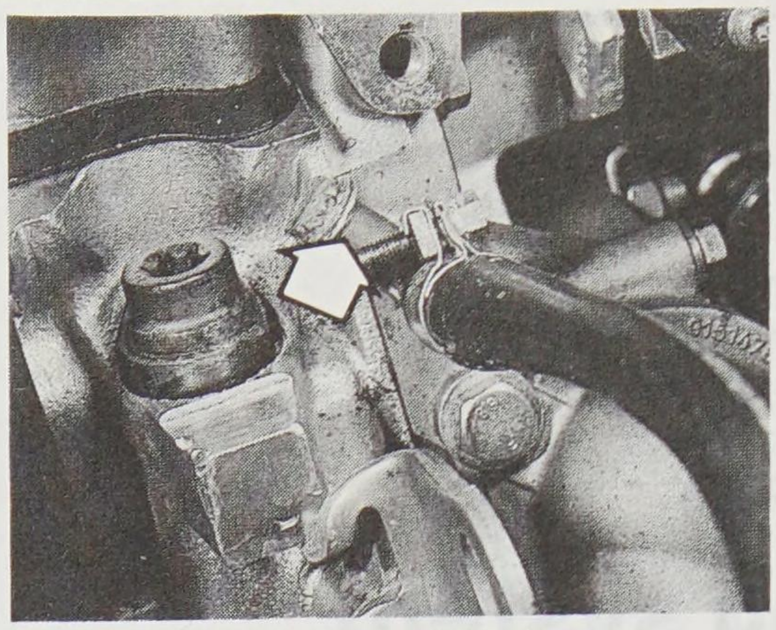
A water pump, mounted on the cylinder block and driven by the camshaft drivebelt, circulates the coolant around the system. The flow of coolant through the radiator is controlled by a thermostat.

The interior heater matrix is constantly supplied with coolant from the cooling system, there being no water valve. Hot air supply to the car interior is controlled by a ducted flap.

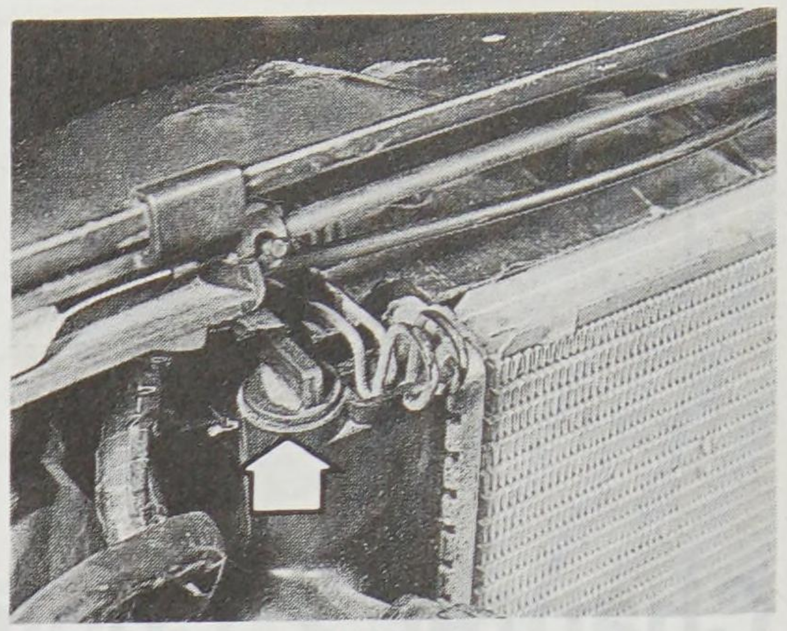
The cooling system functions in the following manner. After a cold start the thermostat valve is closed and coolant circulates only through the engine and heater matrix. When the coolant reaches the operating



3.2 Radiator drain cock



3.7A Thermostat housing bleed screw (arrowed) ...



3.7B ... and radiator bleed screw

temperature of the thermostat, this opens and allows coolant to flow through the radiator, where it is cooled before being returned into the system.

A further feature of the cooling system is the low coolant level warning circuit. Should the coolant drop below a pre-determined level the iamp on the instrument panel will light up and the system must be topped-up. There is therefore no need for periodic checking of the coolant level except at the specified maintenance intervals.

2 Maintenance and inspection

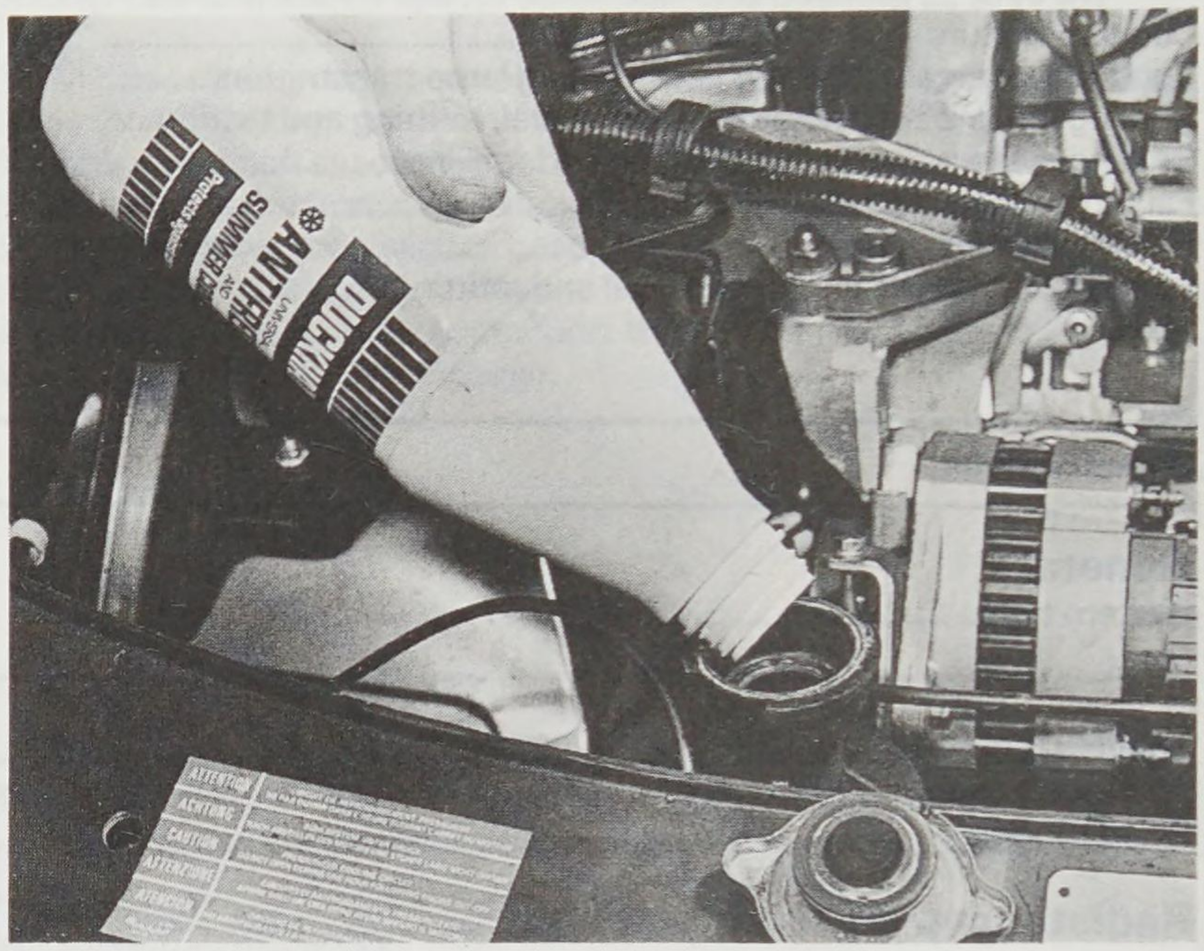
At the intervals laid down in the 'Routine maintenance' *Section at the beginning of this manual, carry out the following operations.*

1 Check the coolant level in the radiator. Top up as necessary (refer to Section 3).
2 Check the cooling system hoses and components for leakage. Do not forget to check the car interior under the heater which will reveal any leaks from the heater.
3 Drain the coolant, flush out the system and refill with fresh antifreeze solution (see Section 3).

3 Cooling system – draining, flushing and refilling

Caution: *The manufacturers state that the radiator cap must not be removed for at least one hour after the engine has stopped running. This is a precaution against scalding by the coolant which can boil violently when the cap is removed and the system depressurised. Provided care is taken, and the cap is covered with a heavy cloth during removal, this time period can be reduced to fifteen minutes.*

1 Remove the radiator cap.
2 Unscrew the radiator drain cock (photo) and allow the coolant to drain into a suitable container.
3 Remove the plug on the coolant distribution housing at the rear of the engine to drain the cylinder block. The plug is difficult to reach or see as it is partially hidden by the right-hand driveshaft intermediate bearing housing.
4 Provided the coolant has been renewed at the specified intervals there should be no need to flush the system. However, if the coolant has been neglected and contains excessive amounts of sediment or is discoloured with rust, disconnect the top radiator hose, remove the thermostat, and use a hose to flush the system through until clean water flows from the radiator and cylinder block. Do not hose cold water into a warm engine.
5 If the contamination is very severe, remove the radiator and reverse-flush it, or use a proprietary chemical cleaner, following the manufacturer's instructions.
6 Once the system is clean, refit the hoses and any removed components and tighten the drain cocks/plugs. Use a new sealing washer on the cylinder block drain plug.
7 To fill the system, open the bleed screw above the thermostat housing, and the bleed screw on the radiator, just above the top hose inlet elbow, by a quarter-turn only (photos).

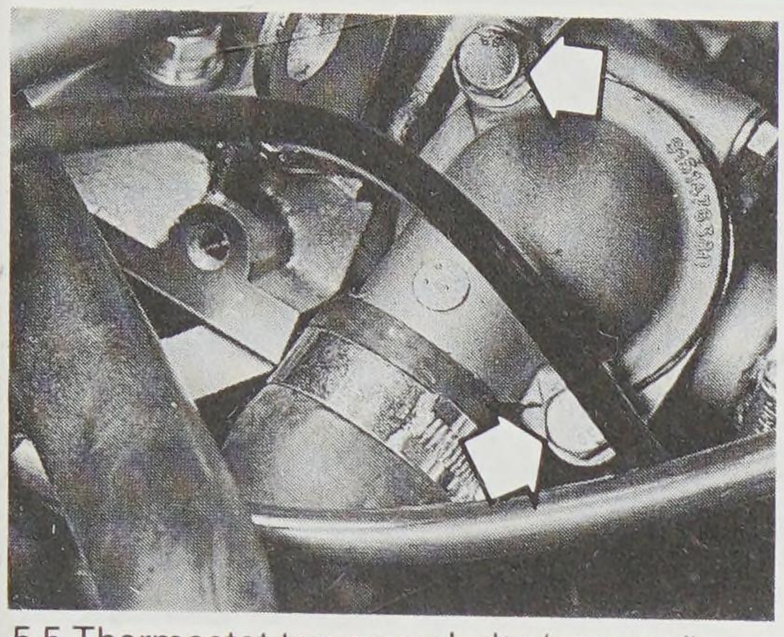


3.8 Topping-up the cooling system

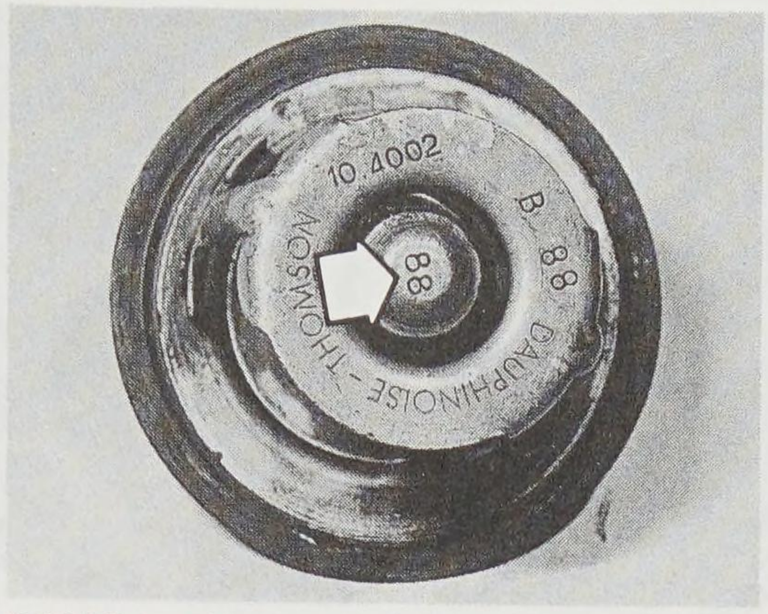
8 Fill the system through the radiator cap with the specified coolant mixed to the proportion of protection desired, to the level of the filler cap (photo).
9 As soon as coolant flows from them, close the bleed screws. Do not fit the radiator cap at this stage.
10 Start the engine and run it until the cooling fan cuts in. This allows any air in the system to escape.
11 Stop the engine when the coolant in the system, viewed through the filler neck, is clear of air bubbles, top up the radiator while still hot, and refit the radiator cap.
12 Finally, run the engine again and check all round for leaks.

4 Coolant mixture – general

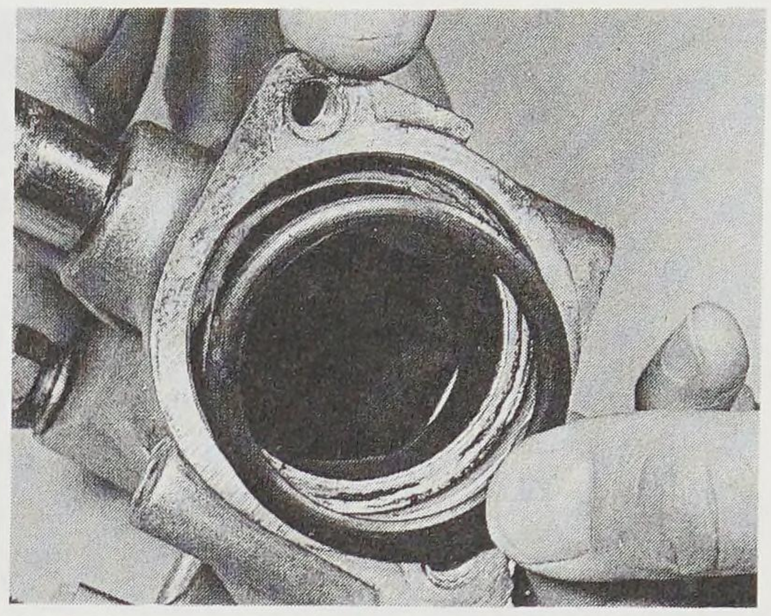
1 Plain water should never be used in the cooling system. Apart from giving protection against freezing, an antifreeze mixture protects the engine internal surfaces and components against corrosion. This is very important in an alloy engine.
2 Always use a top quality glycol-based antifreeze which is recommended for alloy engines.
3 Ideally a 50% mixture of antifreeze and soft or demineralised water should be used to maintain maximum protection against freezing and corrosion. On no account use less than 25% antifreeze.
4 Renew the coolant at the specified intervals as the inhibitors contained in the antifreeze gradually lose their effectiveness.
5 Even when operating in climates where antifreeze is not required never use plain water, but add a corrosion inhibitor to it.



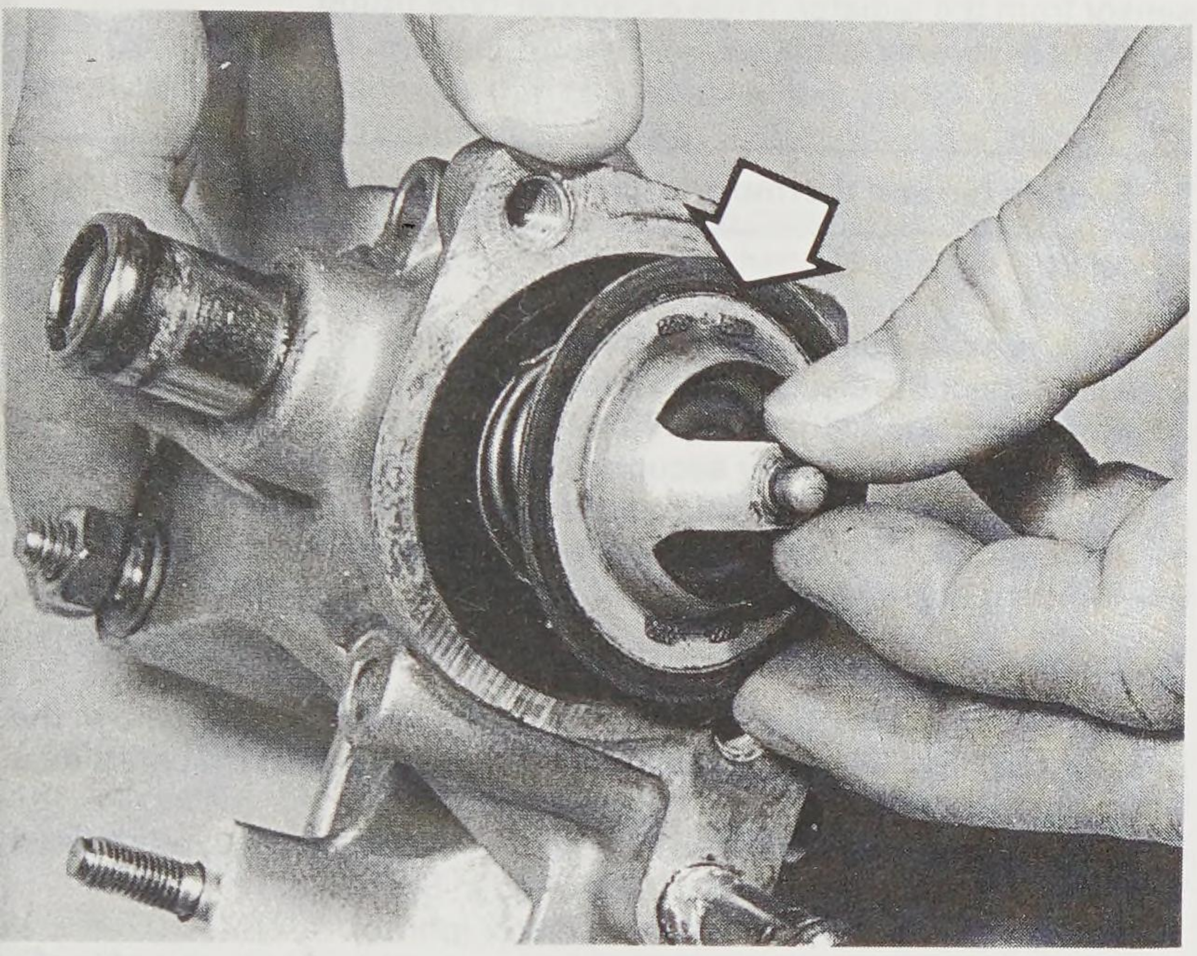
5.5 Thermostat top cover bolts (arrowed)



5.10 View of thermostat showing temperature rating (arrowed)



5.11 Fitting a new O-ring seal



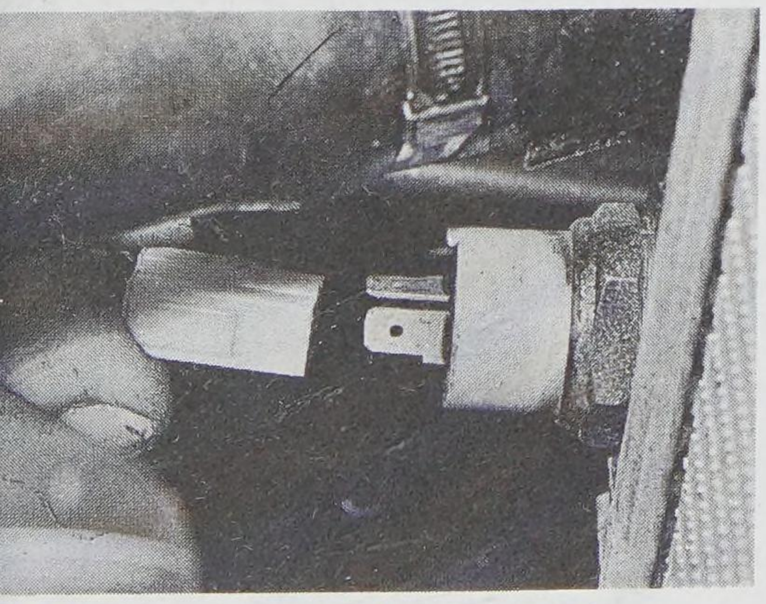
5.12 Fitting the thermostat (flange seal arrowed)

5 Thermostat – removal and refitting

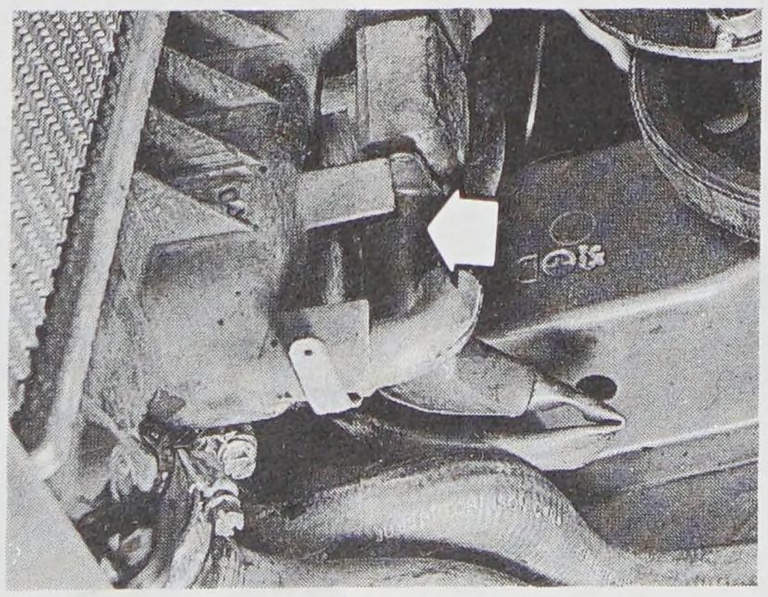
1 The thermostat is located in a housing on the cylinder head adjacent to the distributor.
2 Drain the cooling system as described in Section 3.
3 Remove the air cleaner ducting as necessary for greater access.
4 Disconnect the radiator upper hose from the thermostat housing.
5 Remove the two bolts and lift off the housing top cover (photo).
6 Lift out the thermostat. If it is stuck do not attempt to lever the thermostat out but using a sharp, thin blade cut around the periphery of the thermostat, which should free it from the housing.
7 Remove the O-ring seal from the housing, then clean both the cover and mating surfaces of the housing.
8 If the operation of the thermostat is suspect it can be checked by suspending it in a pan of water, bringing the water to the boil, and checking that the thermostat opens smoothly at the specified temperature and continues to open to its full extent.
9 Remove the thermostat from the water and allow it to cool, when it should close.
10 If this test proves the thermostat to be defective, renew it with one of equal temperature rating (photo).
11 Fit a new O-ring seal to the thermostat housing (photo).
12 Fit a new seal to the thermostat flange then fit the thermostat to the housing (photo).
13 Bolt on the top cover.
14 Reconnect the radiator top hose then fill the system as described in Section 3.
15 Fit the air cleaner ducting.
16 Bleed the cooling system free of air as described in Section 3.

6 Radiator – removal and refitting

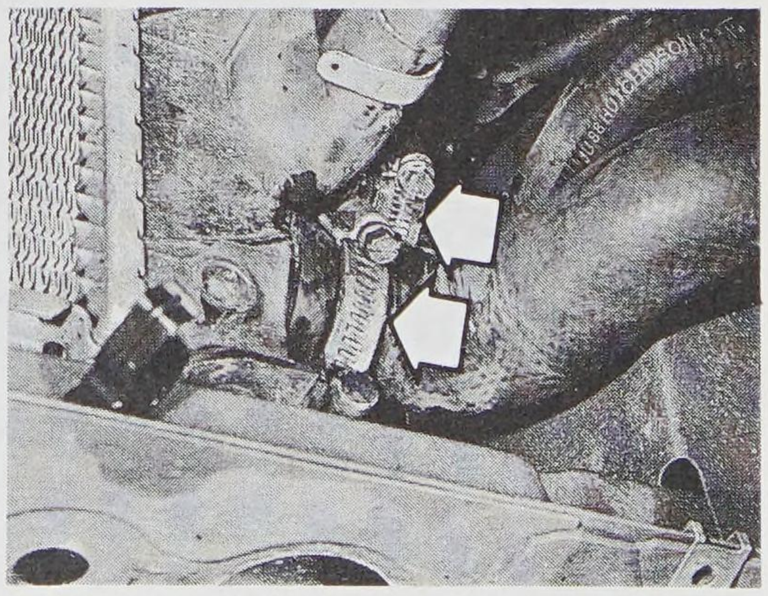
1 Disconnect the battery negative terminal.
2 Disconnect the cooling fan thermo-switch. Note that on early models the thermo-switch was mounted on the outlet side of the radiator. On later models it is on the inlet side (photo).
3 Disconnect the low coolant level sensor (photo).
4 Drain the cooling system as described in Section 3.
5 Remove the cold air intake duct from the front cross panel.
6 Disconnect the radiator upper hose either from the radiator or thermostat housing.
7 Disconnect the throttle housing (fuel injection) or carburettor base heating pipes.
8 Disconnect the radiator lower hoses (photo).
9 Where fitted, disconnect the oil cooler pipes.
10 Release the two upper radiator clips and tilt the radiator forward toward the engine, then lift it from the engine bay (photos).



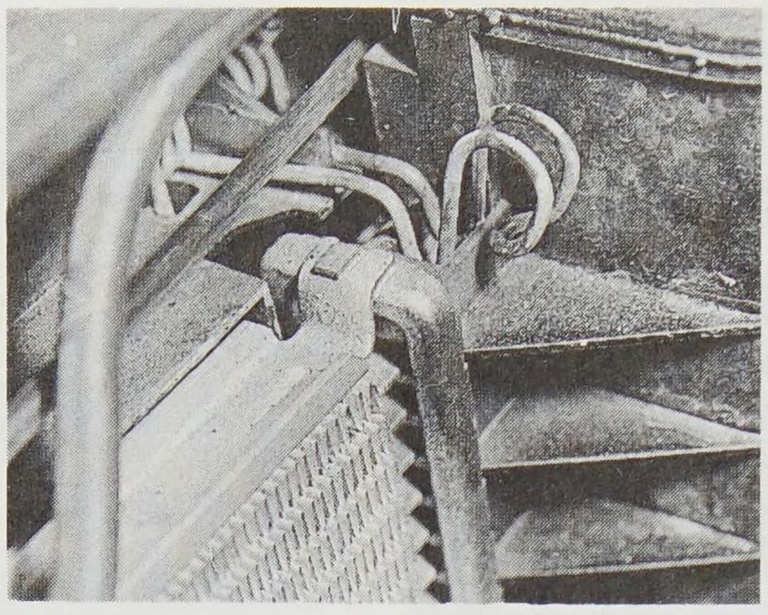
6.2 Disconnecting the thermo-switch



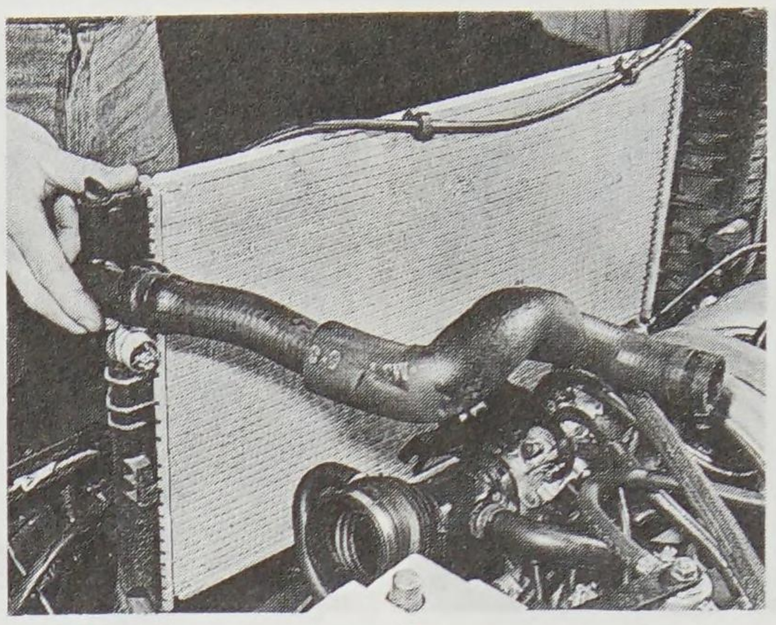
6.3 Low coolant level sensor connector (arrowed)



6.8 Radiator lower hose clips (arrowed)



6.10A Radiator upper retaining clip



6.10B Lifting out the radiator

11 Refit in reverse order, ensuring the location spigots at the lower edge of the radiator enter the rubber grommets in the cross panel.
12 Fill and bleed the cooling system on completion.

Note: *The radiator is of copper-cored construction with plastic side tanks. If it develops a leak either renew the radiator or have it repaired by a specialist repairer.*

7 Radiator cap – general

1 The radiator cap is an often overlooked component of the cooling system.
2 Periodically remove the cap (with the engine cold) and check the seals are in good condition (photo).
3 The valve springs in the cap can become weak with long usage and will operate at a pressure less than their intended pressure rating. It is a good idea to renew the cap at the same intervals as coolant renewal.
4 Remember that the valves relieve pressure both inward and outward to prevent excess pressure or vacuum build-up in the cooling system.

8 Low coolant level sensor – removal and refitting

1 A coolant level sensor is fitted to the right-hand side of the radiator (photo).
2 It is connected electrically to the low coolant level warning lamp in the instrument panel.
3 To remove the sensor, drain the cooling system and unscrew the sensor from the radiator. It has a bayonet-type fitting.
4 Refit in reverse order.

9 Cooling fan and thermo-switch – removal, refitting and testing

Fan

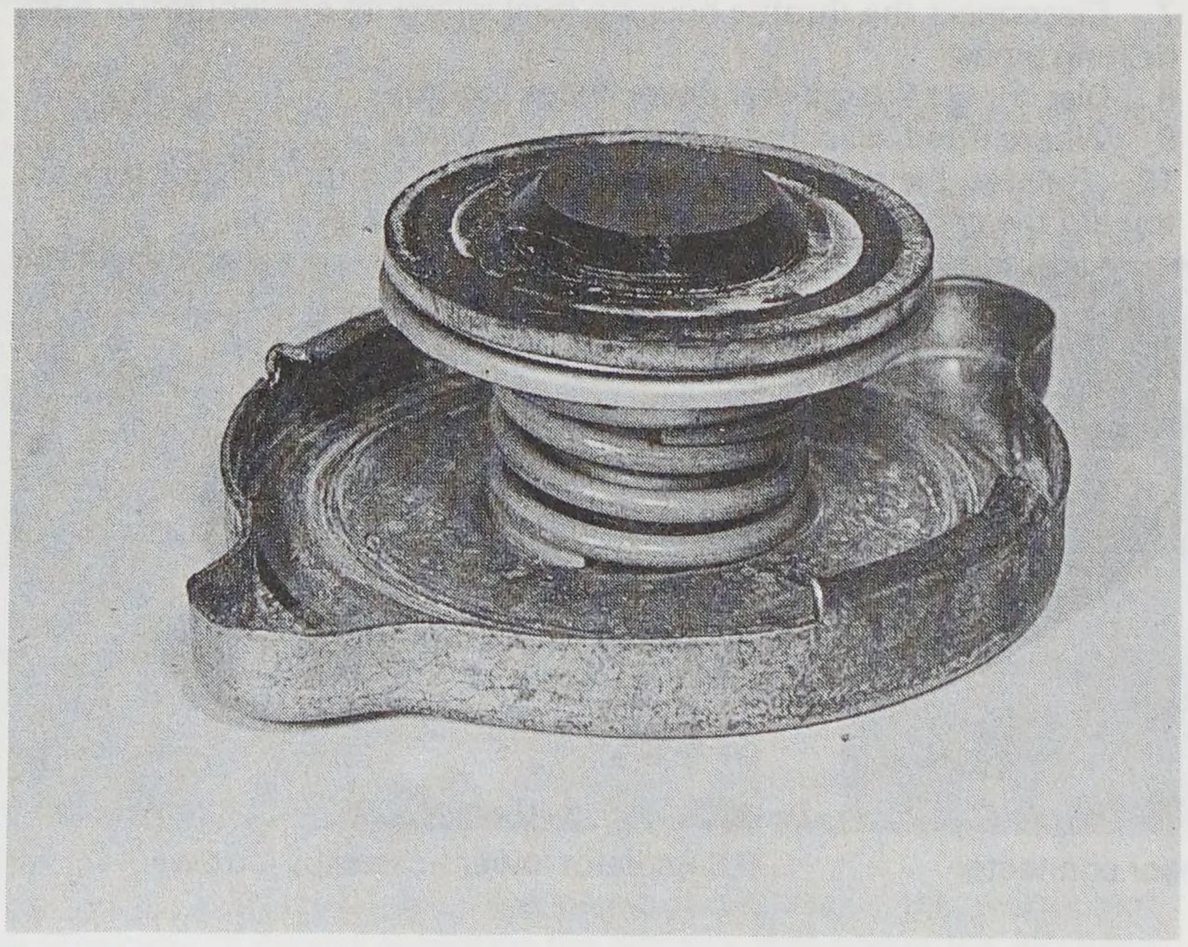
1 Remove the radiator grille (Chapter 12).
2 Disconnect the electrical cable to the fan(s).
3 Remove the radiator as described in Section 6.
4 Unscrew the fan motor securing bolts and remove the fan, unclipping the wiring from the plastic support panel (photo).
5 If the fan motor(s) are defective they must be renewed.
6 Refitting is a reversal of removal.

Thermo-switch

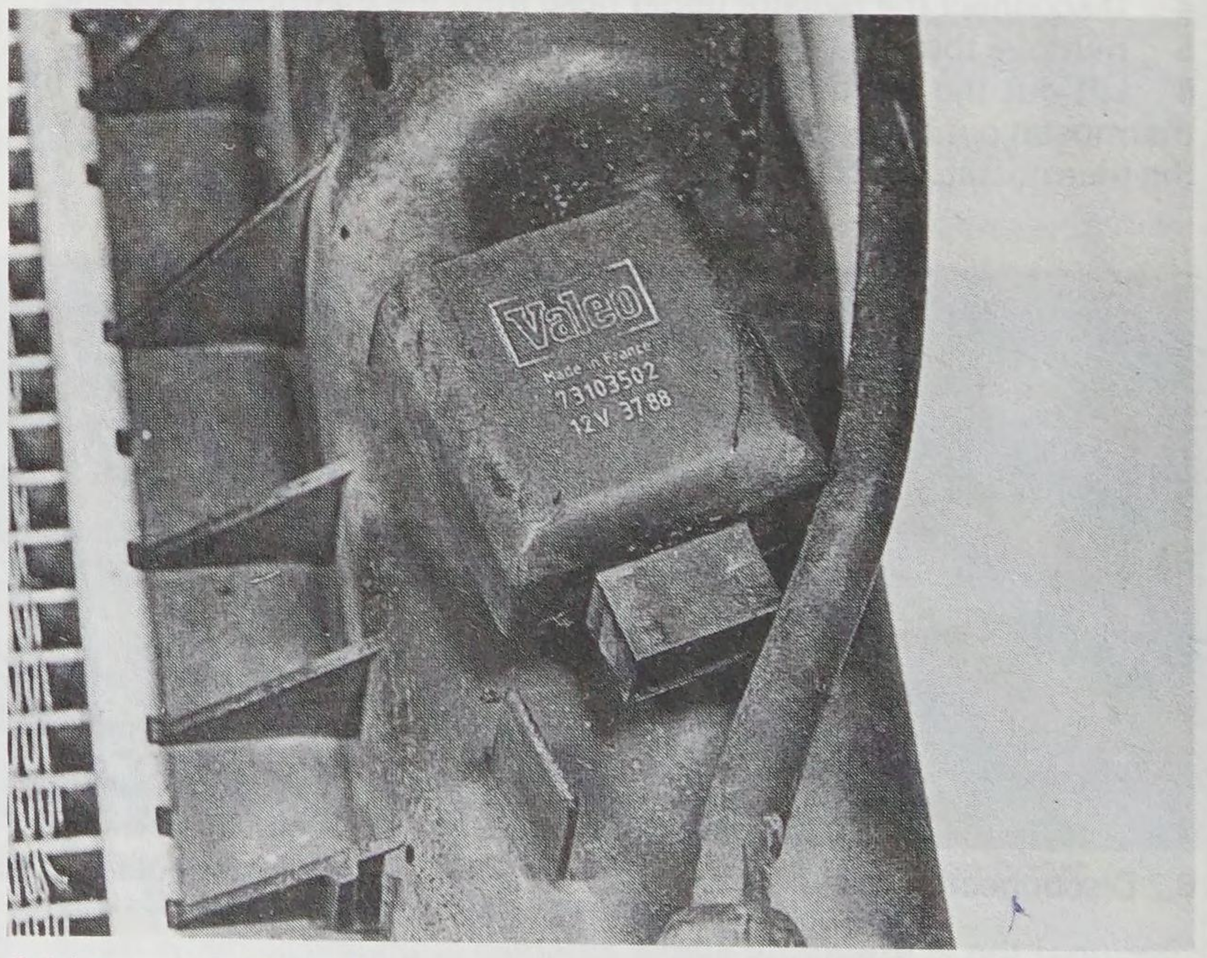
7 The thermo-switch is screwed into the radiator just below the radiator top hose elbow. On early models the switch is mounted near the radiator bottom hose.
8 Disconnect the leads to the switch.
9 Drain the cooling system as described in Section 3.
10 Unscrew the switch from the radiator (photo).
11 Refit in reverse order, using a new sealing washer under the switch.

Testing

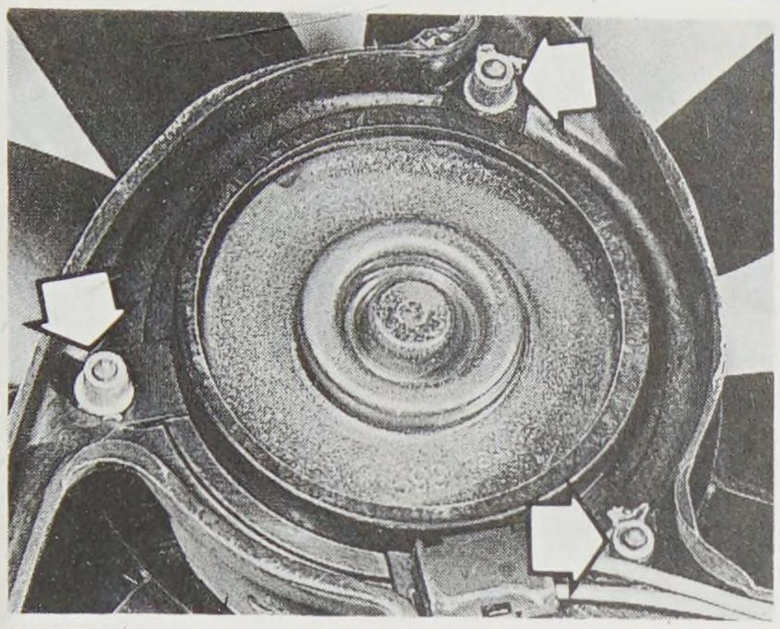
Note: *On carburettor models the fan is supplied from the battery positive, not the accessories positive, allowing the fan to run on after the ignition is switched off. This should be borne in mind when working on a hot engine, although the fan is mounted between the radiator grille and the radiator, and the risk of injury is small.*



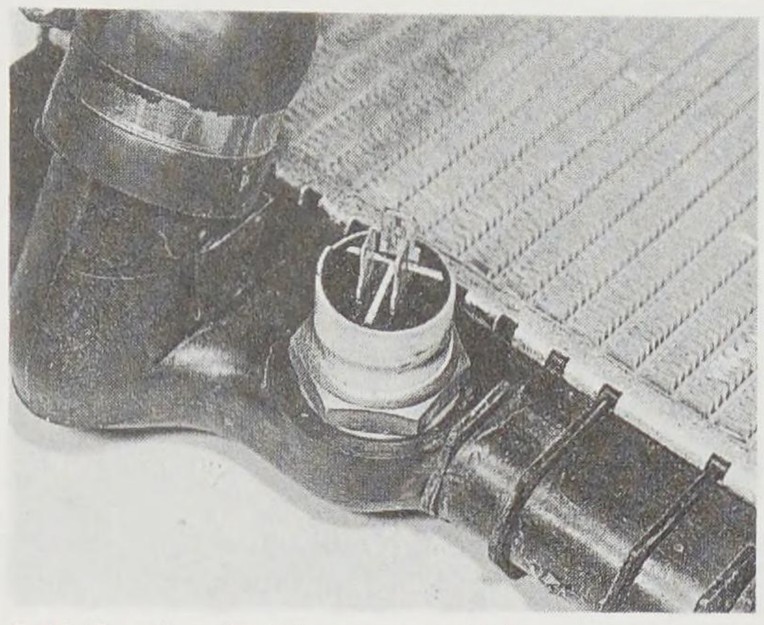
7.2 Radiator cap seals and spring



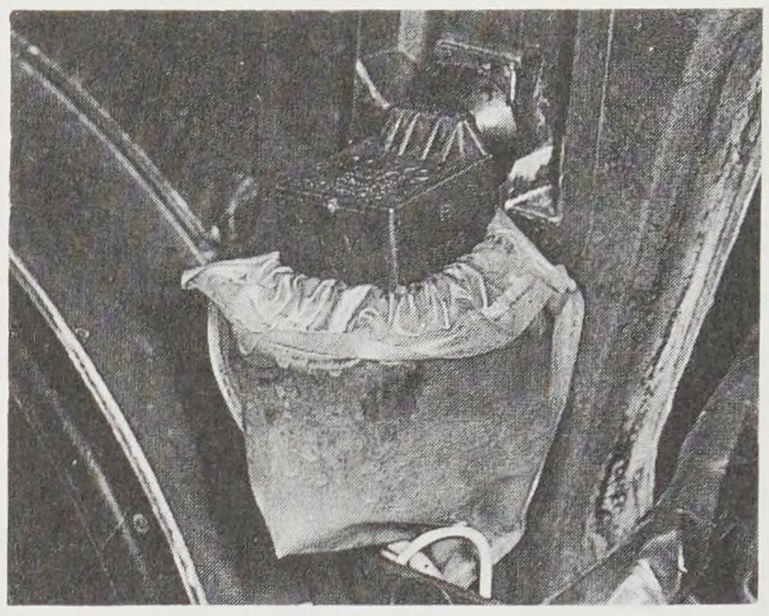
8.1 Low coolant level sensor



9.4 Fan motor securing bolts (arrowed)



9.10 Cooling fan thermo-switch



9.18 Cooling fan relay

12 On carburettor models bridge the red (126) and yellow (126C) terminals on the switch. The fan should run at low speed.
13 Bridge the red (126) and red (126A) terminals on the switch. The fan should run at high speed.
14 On fuel injection models, earth out the green terminal (58C) on the switch. The fan should run at low speed, when the ignition is switched on.
15 Earth out the green wire (58J) on the switch. The fan should run at high speed when the ignition is switched on.
16 On models with twin fans, earthing out both wires should cause both fans to run at high speed.
17 If the switch proves to be defective it must be renewed.
Note: *On models with air conditioning the fans are controlled by an electronic control unit, and testing of the system is best left to your Peugeot dealer*

Cooling fan relay

18 A cooling fan relay is mounted on the plastic fan support panel behind the radiator grille (photo).

Cooling fan resistor

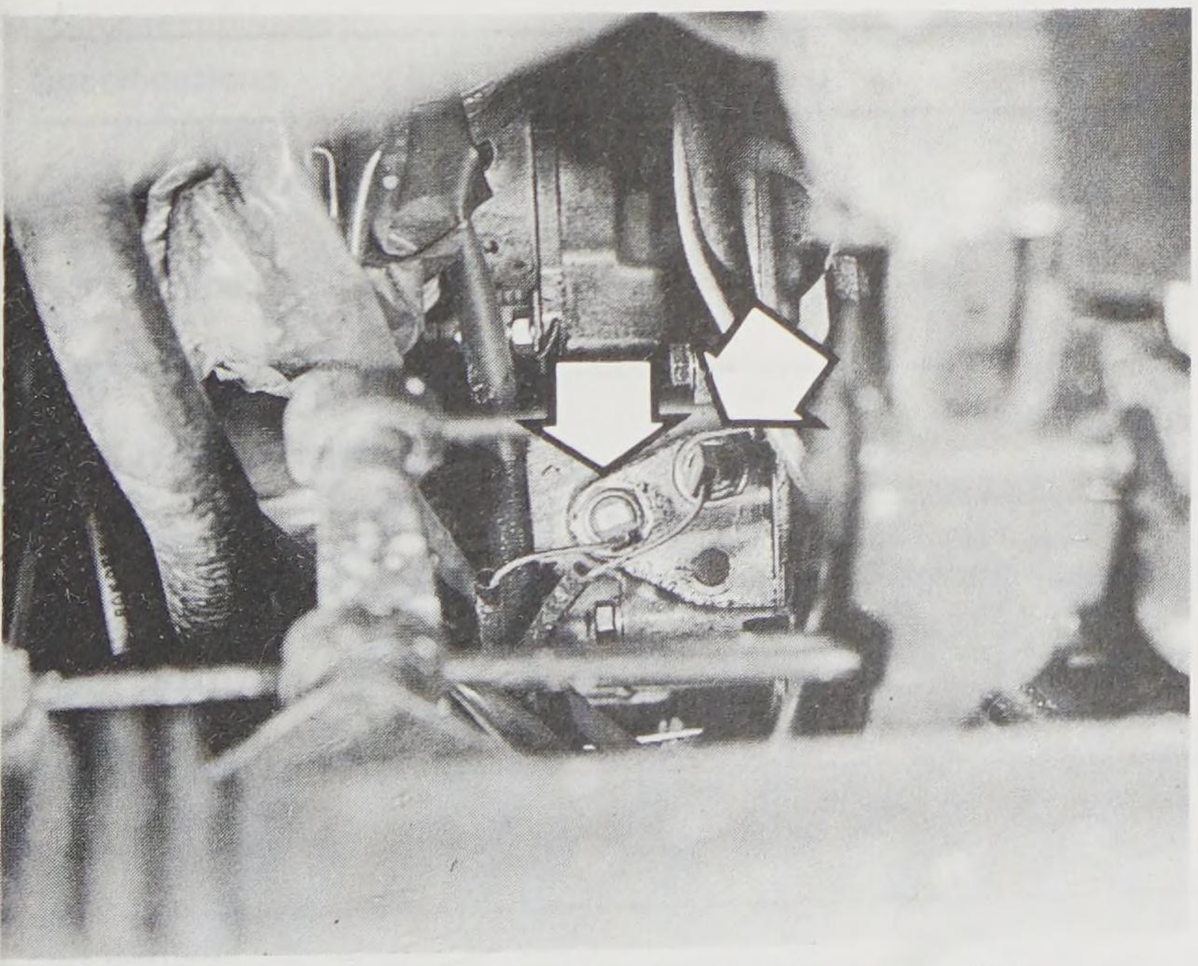
19 A cooling fan in-line resistor is located under the front right-hand wheel arch.

10 Coolant temperature gauge and warning lamp transmitters

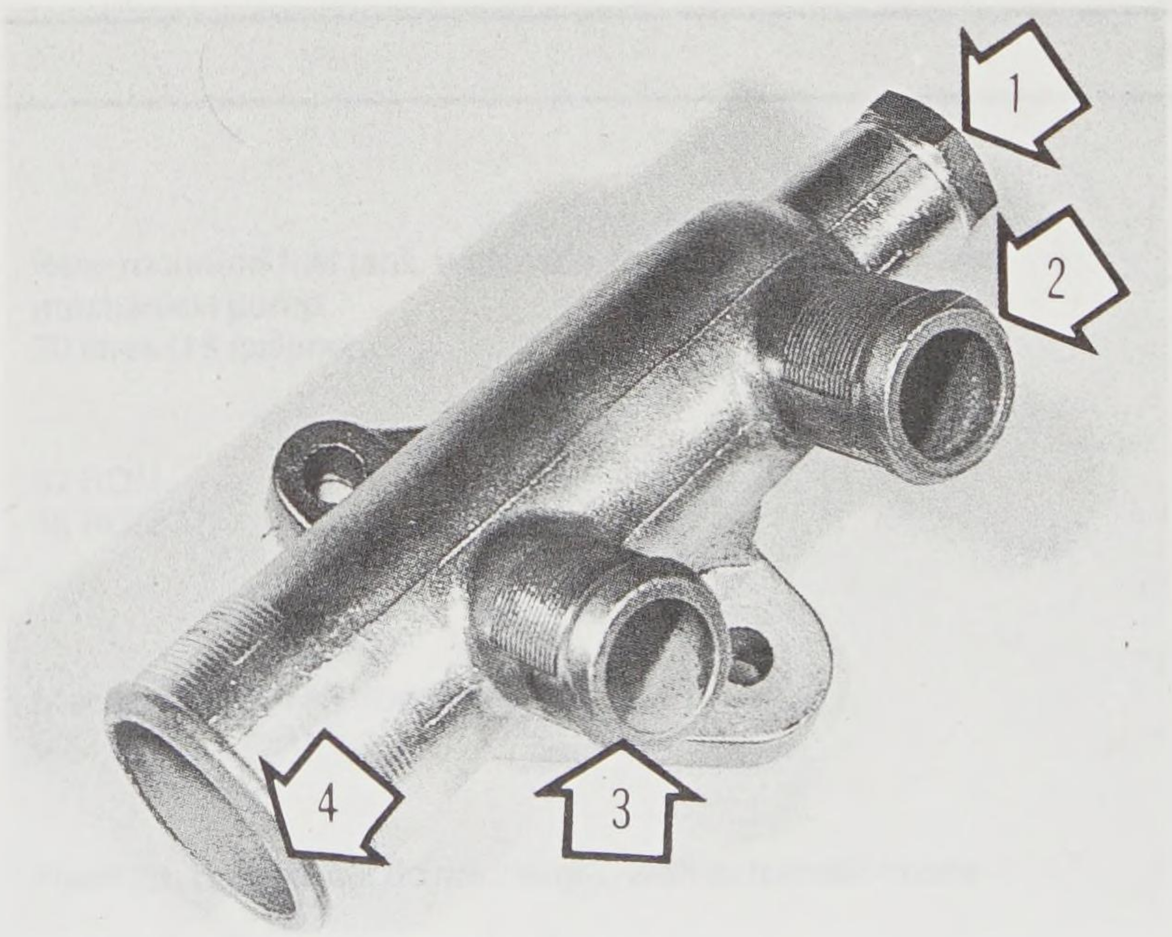
1 All models have a coolant temperature gauge and coolant temperature warning lamp. Do not confuse them with the low coolant level indicator which is screwed into the radiator.
2 The transmitters are screwed into the bottom of the coolant housing on the distributor end of the engine (photo).
3 The transmitter for the gauge has a red wire (connection number 47) and that for the warning lamp a green wire (connection number 47A).

11 Water distribution housing – removal and refitting

1 A water distribution housing is bolted to the rear of the cylinder block, and incorporates the cylinder block drain plug (photo).
2 It is difficult to see and reach with the engine *in situ* because of the right-hand driveshaft intermediate bearing housing, but it is unlikely that the distribution housing would require removal in service.
3 If it is to be removed during engine overhaul, it is secured by Allen-headed bolts.
4 On refitting, renew the drain plug sealing washer and distribution housing gasket.

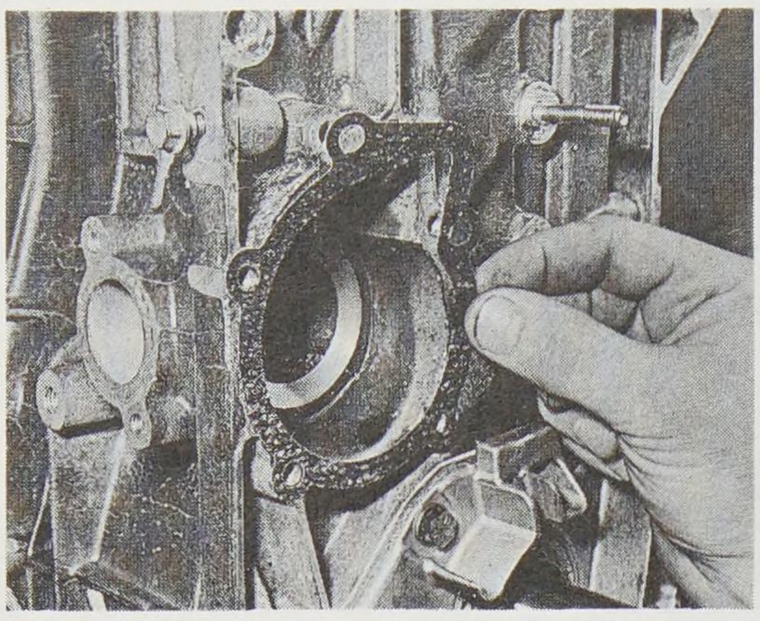


10.2 Coolant temperature gauge and warning lamp transmitters (arrowed)

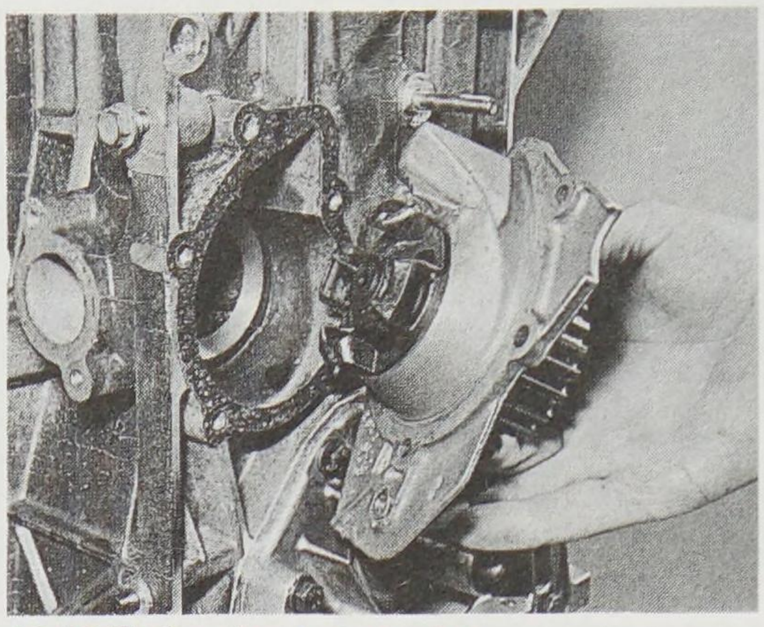


11.1 Water distribution housing (removed)

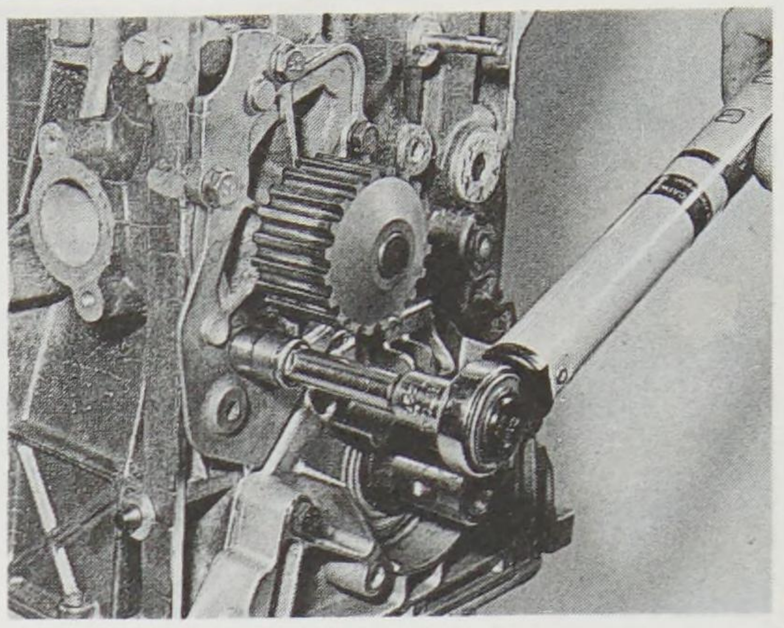
1 Bleed screw
2 Heater connection
3 Radiator connection
4 Radiator connection



12.8A Fitting a new water pump gasket



12.8B Fitting the water pump ...



12.8C ... and tightening the bolts

12 Water pump – removal and refitting

Note: *The water pump is a sealed unit and cannot be overhauled. If defective, it must be renewed.*

1 Disconnect the battery negative terminal.
2 Drain the cooling system as described in Section 3.
3 Remove the camshaft drivebelt as described in Chapter 1.
4 On all models, remove the camshaft drivebelt tensioner and the camshaft drivebelt rear cover.
5 On Mi 16 models, release the tip of the cover from the water pump housing.
6 On all models, unbolt and remove the water pump and gasket.
7 Clean all traces of gasket from the mating surfaces.
8 Refitting is a reverse of removal using a new gasket and tightening the securing bolts to the specified torque (photos).
9 Fill and bleed the cooling system (Section 3).

13 Fault diagnosis – cooling system

Symptom	Reason(s)
Overheating	Insufficient coolant in system Radiator blocked either internally or externally Thermostat not opening Electric cooling fan or thermo-switch faulty Pressure cap faulty
Overcooling	Faulty, incorrect or missing thermostat Electric cooling fan thermo-switch not switching off
Loss of coolant	Damaged hoses or loose clips Leaking water pump O-ring or gasket, as applicable Blown cylinder head gasket

Chapter 3 Fuel and exhaust systems

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Specifications

Carburettor models

General	
System type	Rear-mounted fuel tank, with carburettor and engine-driven mechanical pump
Fuel tank capacity	70 litres (15 gallons)
Fuel octane rating	
Leaded fuel	97 RON
Unleaded fuel	95 RON
Some models can use unleaded without ignition adjustment – see Chapter 4	
Fuel pump	
Type	Mechanical, driven from camshaft
Pump delivery pressure	0.32 bar (4.6 lbf/in^2)
Carburettor	
Type	Fixed jet, twin barrel, downdraught, with automatic choke
Application:	
XU52C (1580 cc)	Solex 34-34Z1 (446/460)
XU92C (1905 cc):	
Manual transmission	Solex 34-34Z1 (447/462)
Automatic transmission	Solex 34-34Z1 (455/463)

Solex 34-34Z1 (446/460)

	Primary	Secondary
Choke diameter	25	27
Main jet	112.5	132.5
Air correction jet	145 ± 20	140 ± 20
Emulsion tube	18	ZC
Idling jet (fuel)	45 ± 3	50 ± 10
Idling jet (air)	145 ± 20	145 ± 20
Enrichment calibration	50 ± 20	–
Float needle valve	1.8	–
Accelerator pump injector	35	40
Normal idling position (NIP)	9°	–
Choke opening after starting (COAS)	6.0 ± 0.5 mm	
Idle speed	750 ± 100 rpm	
CO content	0.8 to 1.5%	

Solex 34-34Z1 (447/462)

	Primary	Secondary
Choke diameter	26	27
Main jet	117 ± 5	120 ± 5
Air correction jet	150 ± 20	140 ± 20
Emulsion tube	BZ	ZC
Idling jet (fuel)	44 ± 3	90 ± 10
Idling jet (air)	145 ± 20	145 ± 20
Enrichment calibration	50 ± 20	–
Float needle valve	1.8	–
Accelerator pump injector	40	–
Normal idling position (NIP)	9°	–
Choke opening after starting (COAS)	6.0 mm	
Idling speed	750 ± 100 rpm	
CO content	0.8 to 1.5%	

Solex 34-34Z1 (455/463)

As (447/462) except for the following

	Primary	Secondary
Main jet	120 ± 5	120 ± 5
Idling speed	850 ± 100 rpm	

Torque wrench settings

	Nm	lbf ft
Inlet manifold	20	15
Exhaust manifold	20	15

Bosch L3.1 Jetronic fuel injection models

As carburettor models except for the following

Fuel pump

Type	Electric, external
Pump delivery pressure	2.5 bar (36.25 lbf/in^2)
Pump delivery	540 cc per 15 seconds

Fuel octane rating

Leaded fuel	97 RON
Unleaded fuel	95 RON

Ignition must be retarded by 3° for unleaded – see Chapter 4

Calibration

Idle speed	925 ± 25 rpm
CO content (at idle)	2.0 ± 0.5%

Bosch ML4.1 Motronic fuel injection models

As for L3.1 except for the following

Fuel pump

Fuel pump delivery pressure	3.0 bar (43.5 lbf/in^2)

Fuel octane rating

Leaded fuel	97 RON (unleaded must not be used)

Calibration

Idle speed	850 rpm
CO content (at idle)	0.8 to 1.5%

PART A: ITEMS APPLICABLE TO ALL MODELS

1 General description

This Chapter is divided into four parts to cover those items applicable to all models (Part A), carburettor models (Part B), all fuel injection models fitted with the Bosch L3.1 Jetronic fuel injection system (Part C) and Mi 16 models which are fitted with the Bosch Motronic fuel injection system (Part D).

A certain amount of cross-reference is made to avoid undue repetition.

The fuel system comprises a rear-mounted fuel tank from which fuel is drawn by mechanical pump (carburettor models) or electric pump (fuel injection models), for delivery to the engine.

A Solex twin barrel downdraught carburettor is used on all carburettor models. A Bosch L3.1 Jetronic fuel injection system is used on all fuel injection models except the Mi 16 model, which has the Bosch ML4.1 Motronic fuel injection system.

Caution: *Before working on any part of the fuel system, read the safety precautions in the Safety First! section at the beginning of this manual. Comply with all fire precautions and disconnect the battery before making any fuel or electrical disconnections*

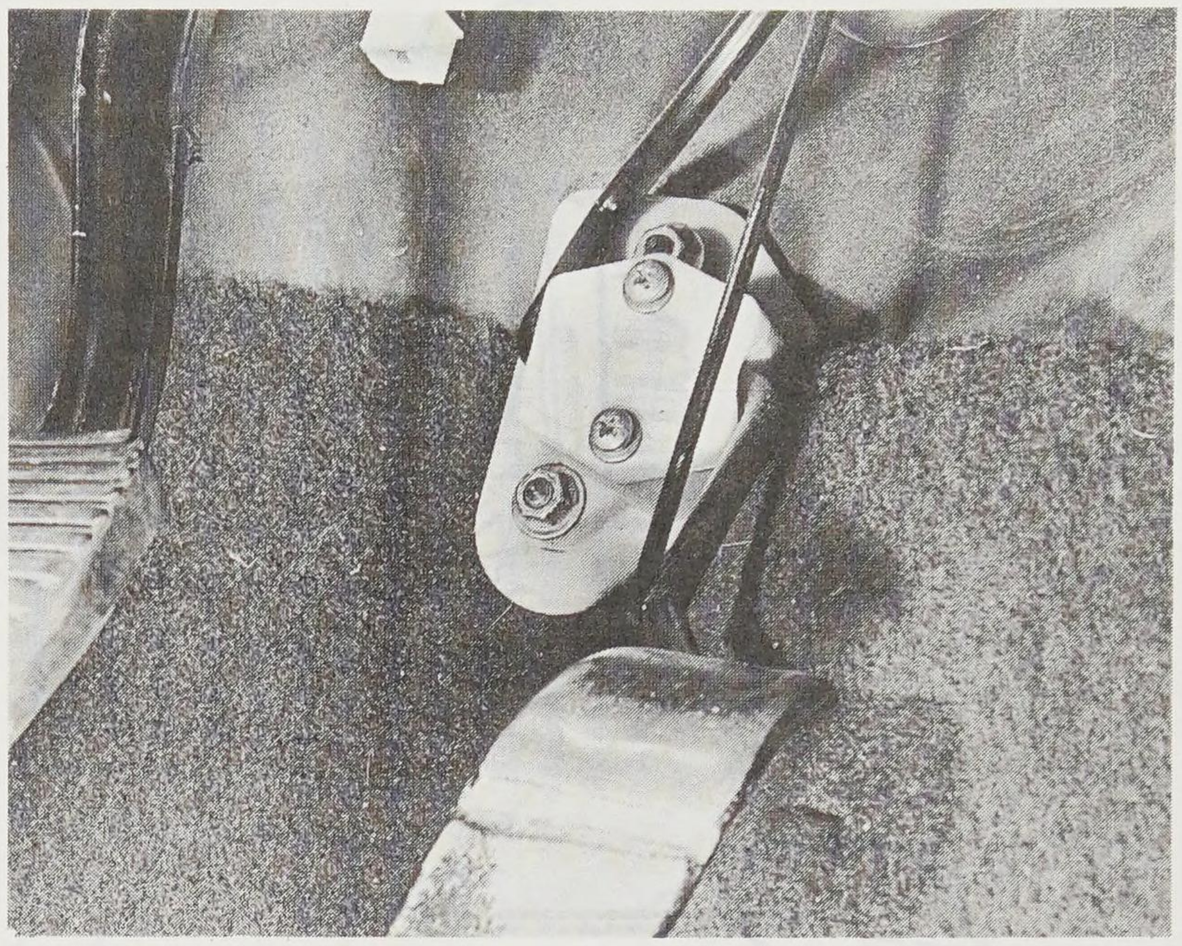
2 Maintenance and inspection

At the intervals given in the 'Routine Maintenance' *section at the beginning of this manual carry out the following operations.*

1 Renew the air filter element (Section 14 or 27).
2 Renew the fuel filter (Section 17 or 38).
3 Remove and clean the fuel filter in the carburettor inlet union (Section 8).
4 Check engine idle speed and mixture settings and adjust as necessary (Section 18, 28 or 46).
5 Periodically inspect all pipes, hoses and components for leaks and damage, and renew as necessary.
6 Check and adjust as necessary the accelerator cable (Section 11 or 24).

3 Accelerator pedal – removal and refitting

1 Disconnect the accelerator cable from the top of the pedal as described in Section 11 or 24.
2 Remove the two screws from the pedal pivot bush and lift out the pedal (photo).
3 Refit in reverse order, using a little grease on the pivot.



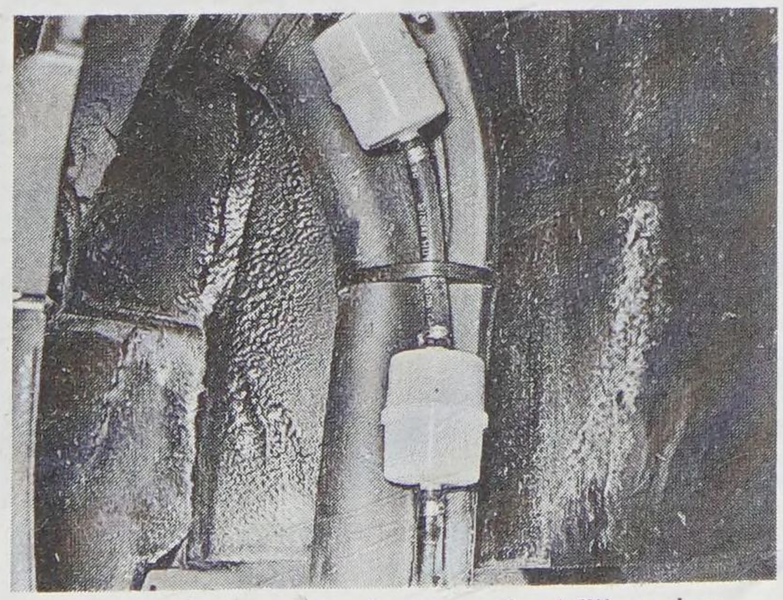
3.2 Pedal pivot securing screws

4 Fuel filler hose – removal and refitting

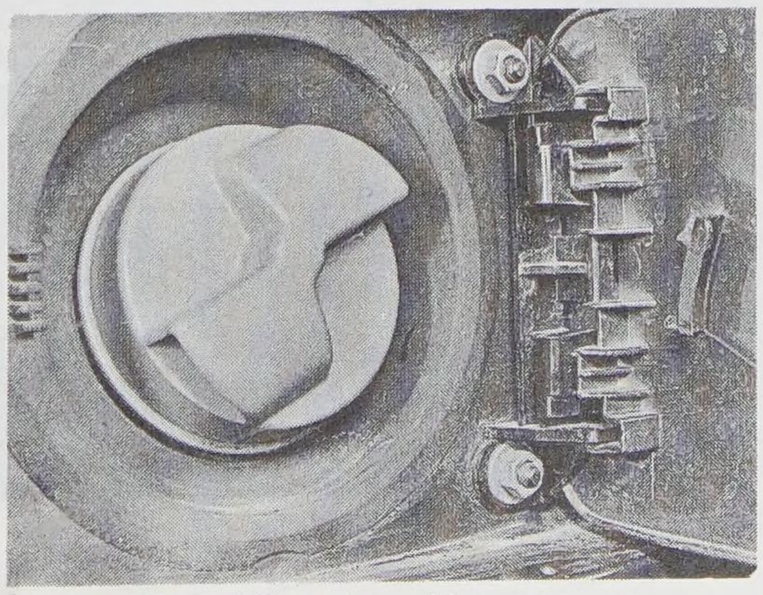
1 Remove the right-hand rear wheel and wheel arch liner.
2 Disconnect the vent hoses at the unions closest to the fuel tank end.
3 Disconnect the fuel filler hose at the tank end and allow any fuel to drain into a suitable container.
4 Disconnect the upper end of the filler hose from the filler orifice and remove the hose and vent pipes. The plastic chambers are to assist in venting (photo).
5 The fuel filler lid is secured to the rear wing panel by nuts (photo).
6 Refit in reverse order.

5 Fuel gauge sender – removal and refitting

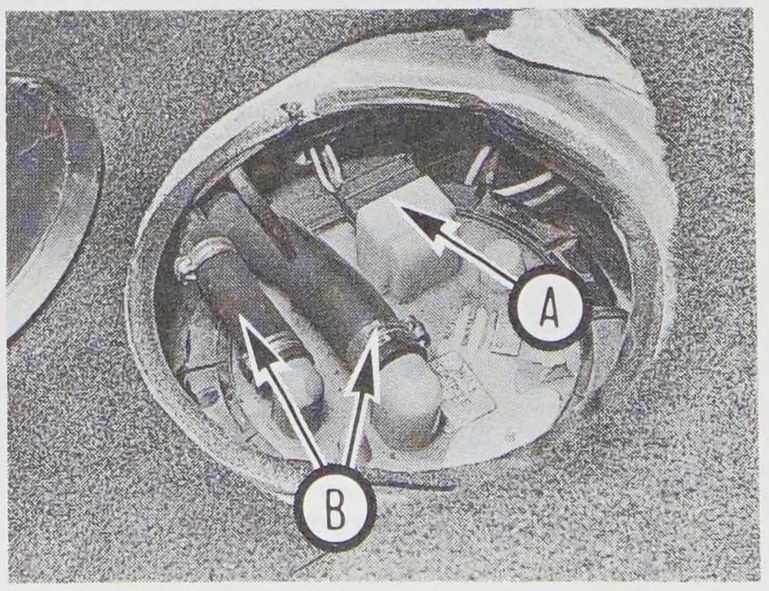
1 Remove the rear seat squab as described in Chapter 11.
2 Prise out the rubber cover from the floor panel.
3 Disconnect the electrical plug and the fuel supply and return hoses. Tie some string to the ends of all three connections to prevent them being lost between the tank and floor panel (photo).
4 Unscrew the plastic ring securing the sender to the fuel tank.
5 Lift out the sender and float assembly.
6 If necessary, remove the filter from the bottom of the unit and wash it in clean fuel.
7 Refitting is a reversal of removal.



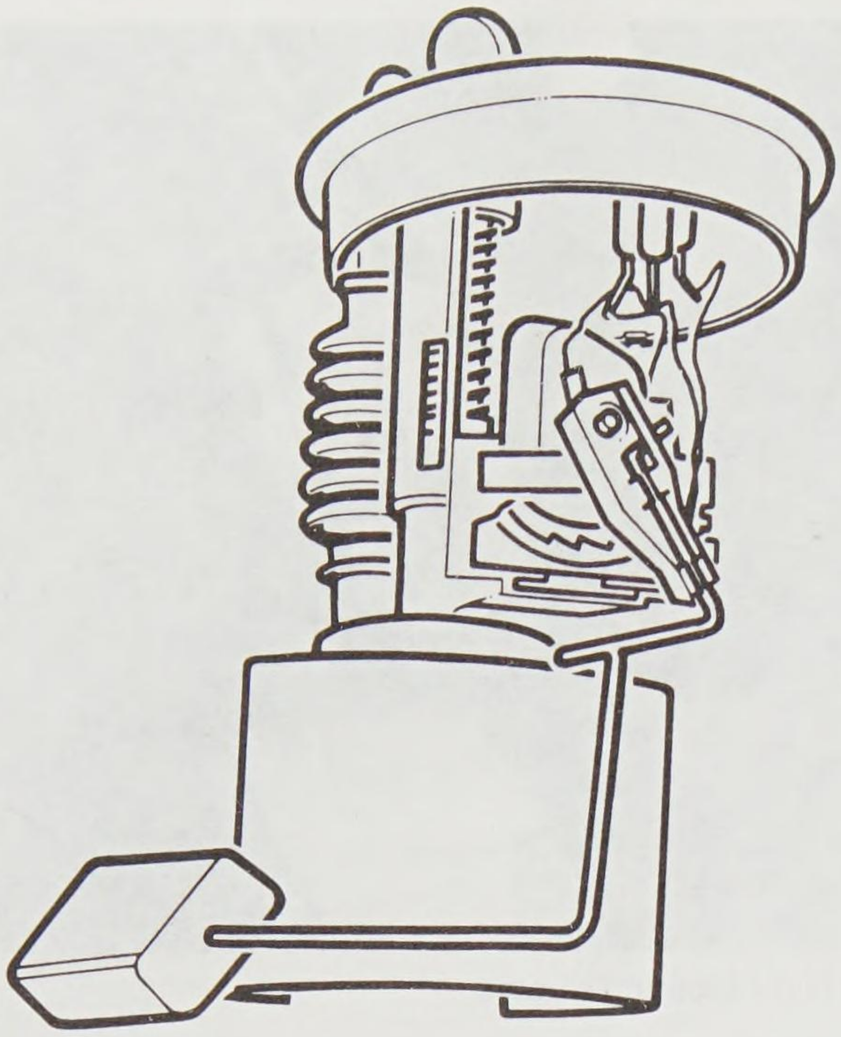
4.4 Plastic vent chambers on fuel filler pipe system



4.5 Fuel filler lid is secured by nuts



5.3 Electrical plug (A) and fuel hose connections (B) on fuel gauge sender



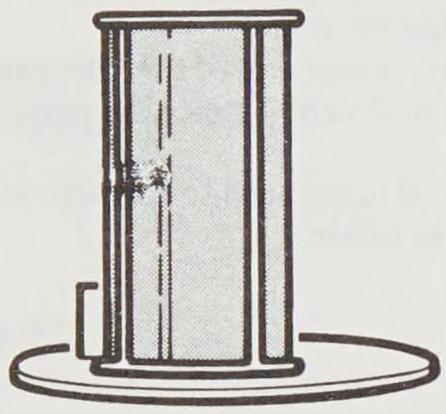
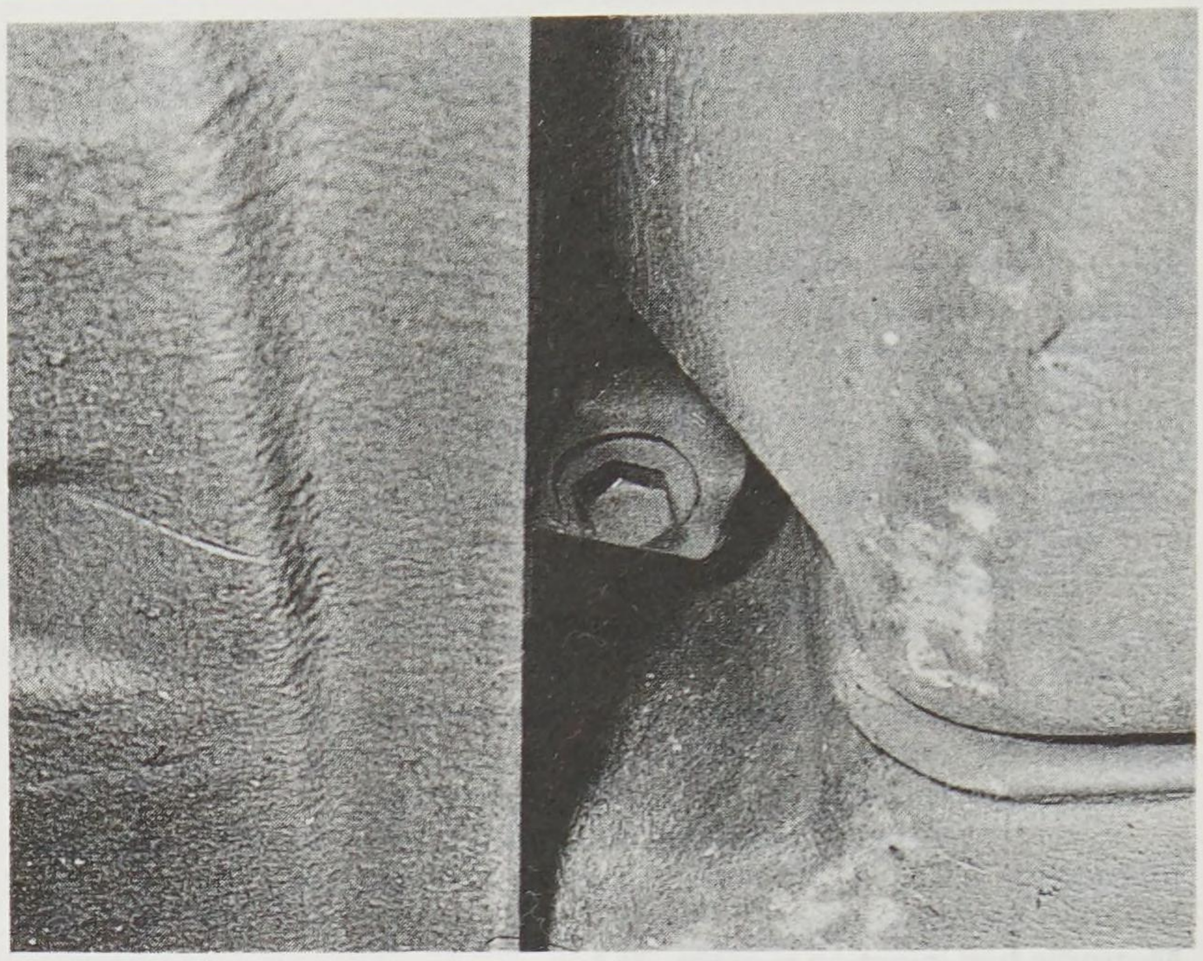


Fig 3.1 Fuel gauge sender unit showing fuel filter (arrowed) (Sec 5)

6 Fuel tank – removal and refitting

1 Disconnect the exhaust downpipe from the exhaust manifold, unhook and remove the exhaust.
2 Remove the exhaust heatshield from the fuel tank.
3 Disconnect the handbrake cable at the equaliser bracket and release the primary cable from the clips in the fuel tank.
4 There is no drain plug in the tank so the tank will either have to be siphoned dry, or the fuel filler pipe can be disconnected and any fuel allowed to drain into a suitable container.
5 Disconnect the fuel gauge transmitter and fuel feed and return pipes as described in Section 5.
6 Support the tank on a trolley-jack.

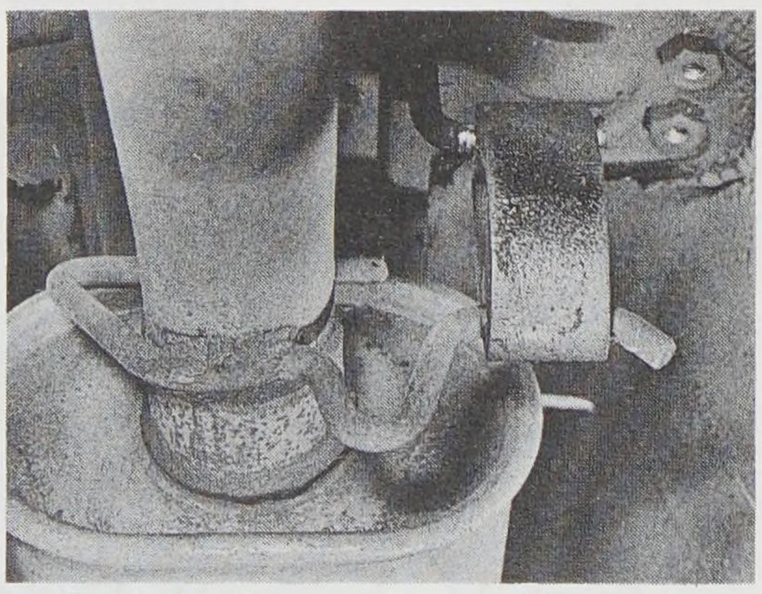


6.7 Fuel tank support strap bolt

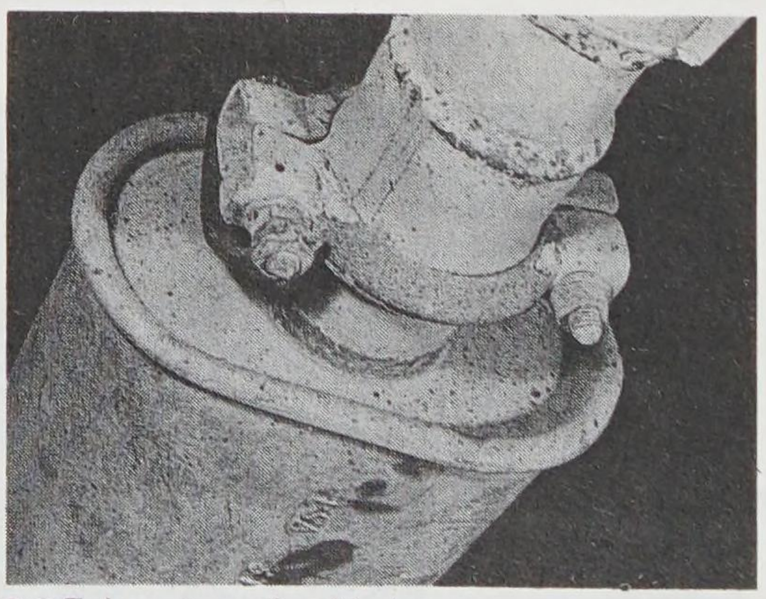
7 Remove the tank support straps (photo) and lower the tank on the jack, disconnecting the vent pipes as soon as they can be reached.
8 The fuel tank is made of a composite plastic material and if it is damaged or split consult your dealer about repair.
9 Refit in reverse order, adjusting the handbrake cables on completion.

7 Exhaust system – inspection, removal and refitting

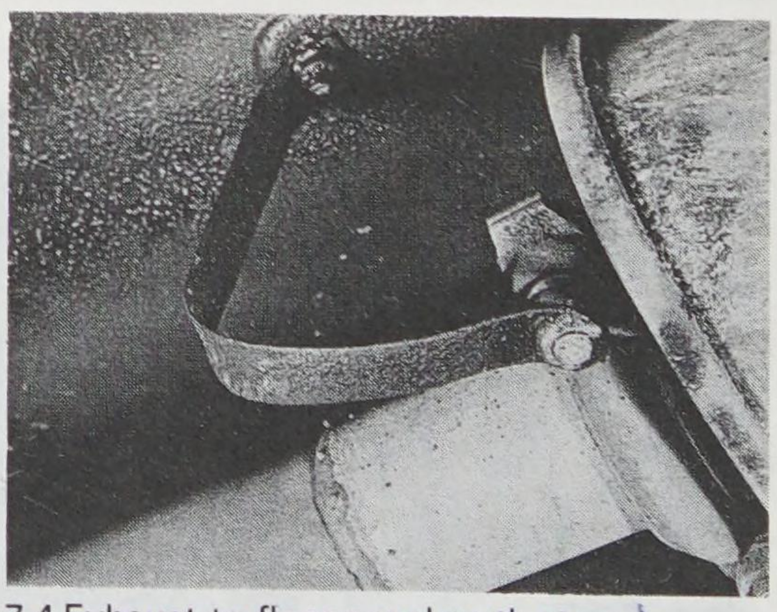
1 The exhaust is a three-part system consisting of the front downpipe which is connected to the exhaust manifold, a centre section incorporating the front silencer, and the rear section and rear silencer.
2 The system is attached at points along its length to the floor panel by metal hooks and rubber suspenders (photo).
3 The various sections are joined to each other using U-clamps (photo).
4 Earth straps are also used at various locations (photo).
5 The exhaust downpipe is connected to the exhaust manifold by spring-loaded bolts (photo).
6 An exhaust heat shield is bolted to the fuel tank (photo).
7 The exhaust system should be inspected at regular intervals for corrosion, holes and splits by starting the engine and listening under the vehicle for signs of 'blowing' as the exhaust gases escape. This is often evident by increased exhaust noise. A badly holed exhaust can also cause carburation problems as it affects back pressure.
8 Also check that the rubber suspenders are in good condition and not perished or otherwise worn, causing the exhaust to knock against adjacent components.
9 The renewal of a corroded exhaust is best left to an exhaust specialist who can do the job in minutes as opposed to struggling at home for hours. Exhaust joints become 'welded' together by heat and



7.2 Typical exhaust system rubber support



7.3 Exhaust section U-clamp



7.4 Exhaust-to-floor panel earth strap

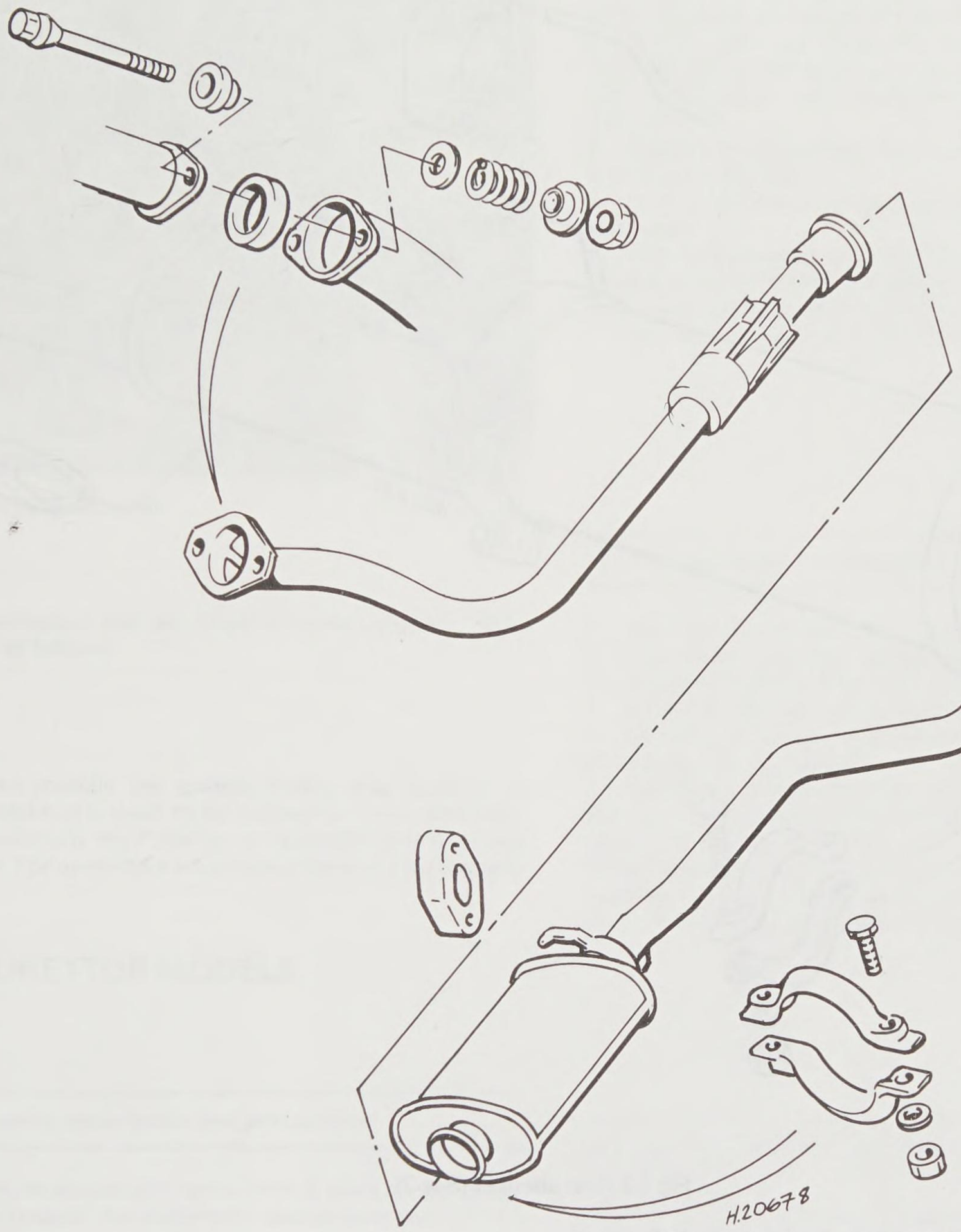
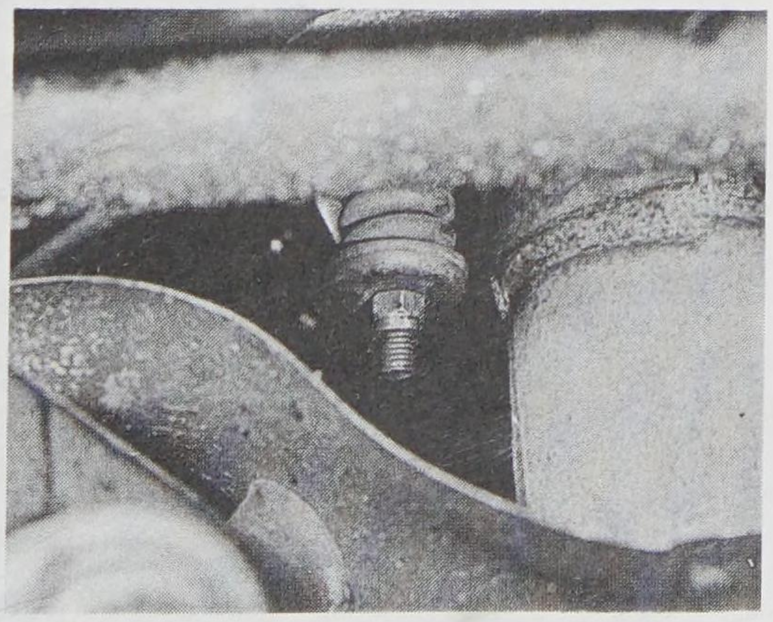
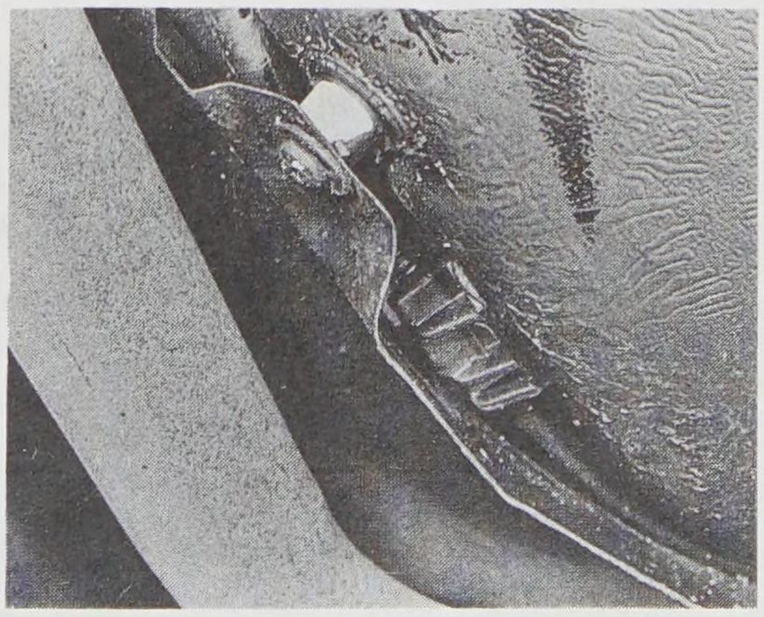


Fig 3.2 General view of the front exhaust system (Sec 7)



7.5 One of the exhaust downpipe-to-manifold bolts



7.6 Heat shield on underside of fuel tank

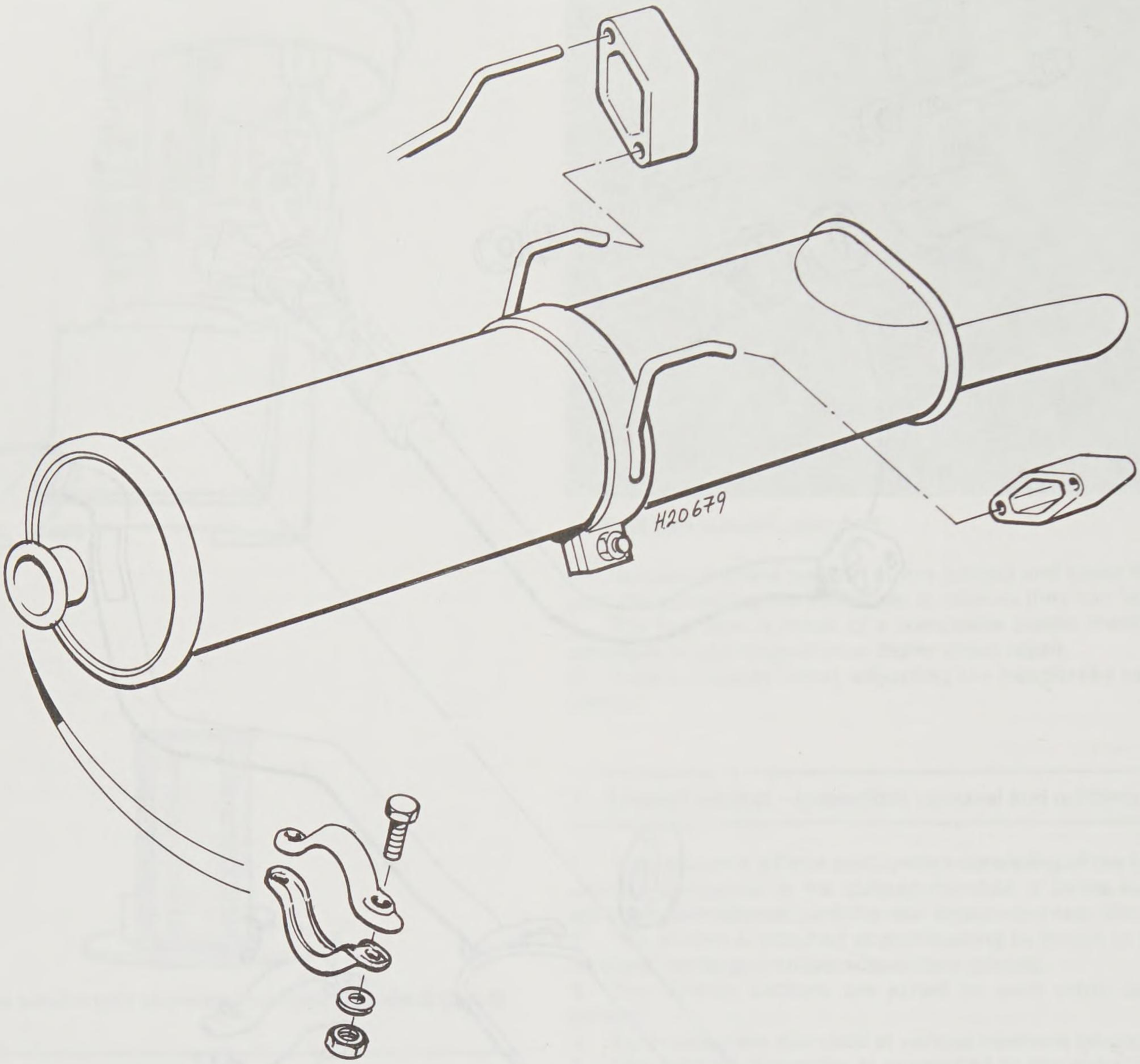


Fig 3.3 Rear silencer (Sec 7)

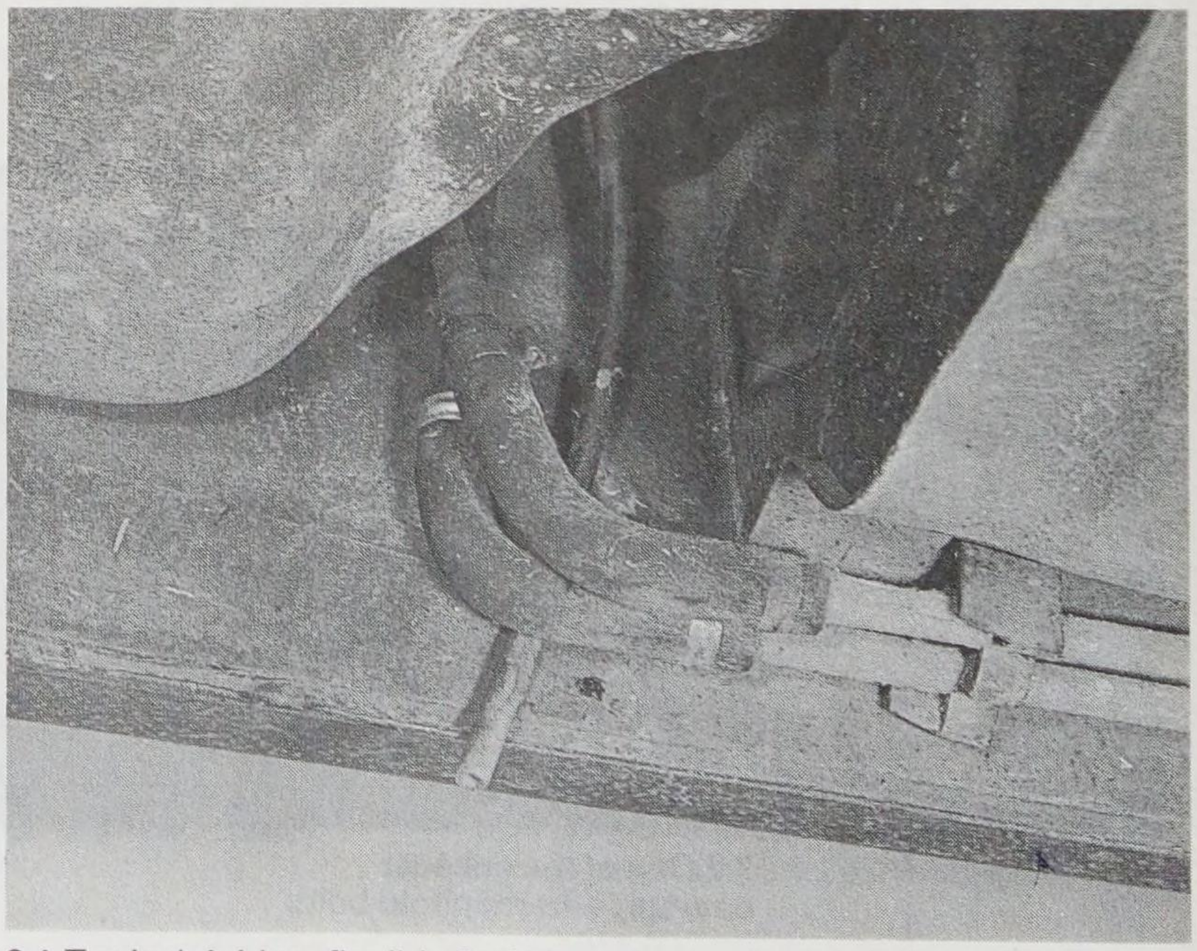
corrosion after a period of time and have to be hacksawed off. Renewal of one section is rarely successful.

8 Fuel hoses and pipelines – general

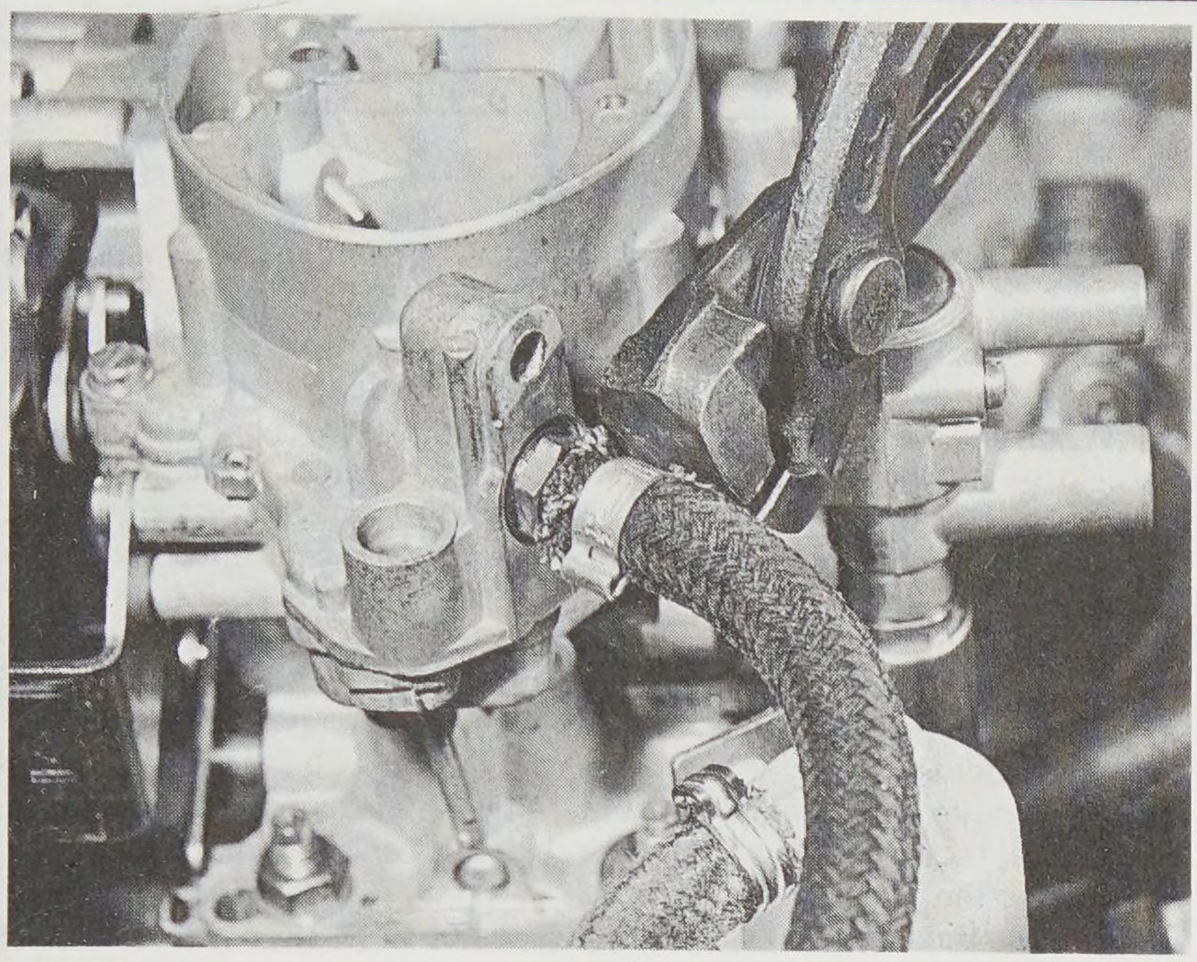
1 Flexible hoses and rigid pipelines are used throughout the fuel system (photo).
2 The hose securing clips used as original equipment are one-piece types which are clamped around the hose union using special pliers (photo).
3 To remove the clips they must be carefully sawn through and are consequently destroyed. Renew them with worm drive ('Jubilee') type clips or obtain new original clips if the special pliers or something similar is available.

9 Operation on unleaded fuel

1 Unleaded fuel will theoretically be available in all EC countries as time progresses, and may eventually replace leaded fuel altogether.
2 It is generally believed that continuous use of unleaded fuel can cause rapid wear of conventional valve seats. Hardened valve seats



8.1 Typical rigid-to-flexible fuel hose connections



8.2 Original hose clip being clamped

which can tolerate unleaded fuel are fitted to some engines. These engines are currently as follows:

XU52C - B2A
XU92C - D2D
XU9J2 - D6A

3 On some of these models the ignition timing may have to be retarded when unleaded fuel is used. Refer to Chapter 4 Specifications.
4 These recommendations may change as unleaded fuel becomes more widely available. For up-to-date information consult your Peugeot dealer.

PART B: CARBURETTOR MODELS

10 Carburettor - general description and precautions

A Solex twin barrel, downdraught carburettor is used on all 1.6 and 1.9 litre carburettor models. An automatic choke operates on the primary barrel only.

A vacuum-operated choke unloader, accelerator pump and full load enrichener device are fitted to govern the fuel requirements of the engine over its full operating range.

Caution: *Before working on any part of the fuel system, read the* Safety First! *section at the beginning of this manual. Comply with all fire precautions and always disconnect the battery before making any fuel or electrical disconnections*

11 Accelerator cable - removal, refitting and adjusting

1 Rotate the throttle quadrant to produce slack in the accelerator cable, then unhook the cable from the quadrant (photo).
2 Pull the cable end fitting from the support bracket (photo).
3 Disconnect the cable from the accelerator pedal by depressing the lugs on the plastic end fitting and pushing the fitting from the pedal (photo).
4 Feed the cable through the bulkhead into the engine compartment and remove the cable.
5 Refit in reverse order ensuring the grommet in the bulkhead is not displaced.
6 Adjust the tension in the cable by moving the position of the clip and washer in the serrated end fitting so that the smallest free play possible with the throttle quadrant against its stop is obtained.
7 For vehicles with automatic transmission refer to Chapter 6.

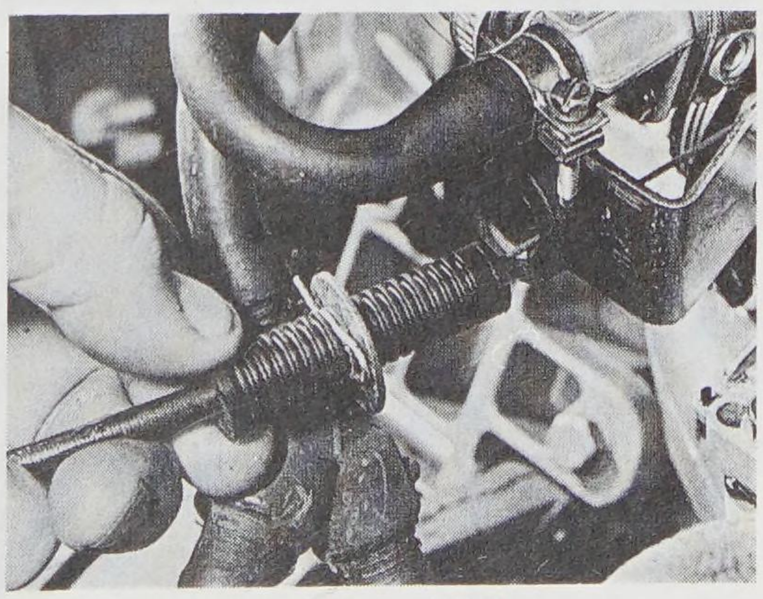
12 Inlet manifold - removal and refitting

1 Remove the carburettor as described in Section 19.
2 Disconnect the brake vacuum servo hose at the manifold.
3 Disconnect the oil filler cap breather hose from the manifold.
4 Unbolt the oil filler tube bracket.
5 Unbolt and remove the inlet manifold, noting the centre clamp secured by one nut (photo).
6 Before refitting the manifold, which is a reversal of removal, clean all traces of old gasket from the mating faces and fit a new gasket. Tighten all nuts to their specified torque.
Note: *The engine gasket kit contains gaskets for both carburettor and fuel injection manifolds. The injection type gasket has cut-outs for the injector ports. Ensure the correct gasket is fitted.*

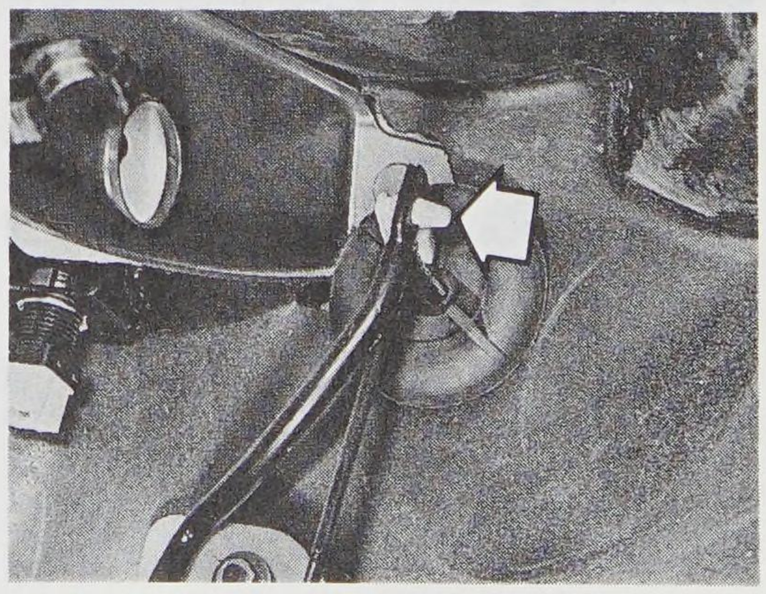
13 Exhaust manifold - removal and refitting

1 Disconnect the exhaust downpipe from the manifold.
2 Where fitted, loosen the clamp nuts and release the power-assisted steering and coolant pipes from the brackets (photo).
3 If fitted, unbolt the heatshield or hot air collector from the manifold.
4 Unbolt and lift off the exhaust manifold (photo).
5 Refit in reverse order using new gaskets (photo) and tightening the securing nuts to the specified torque.
6 Smear some exhaust jointing compound onto the mating faces of the downpipe and manifold before reconnecting them.

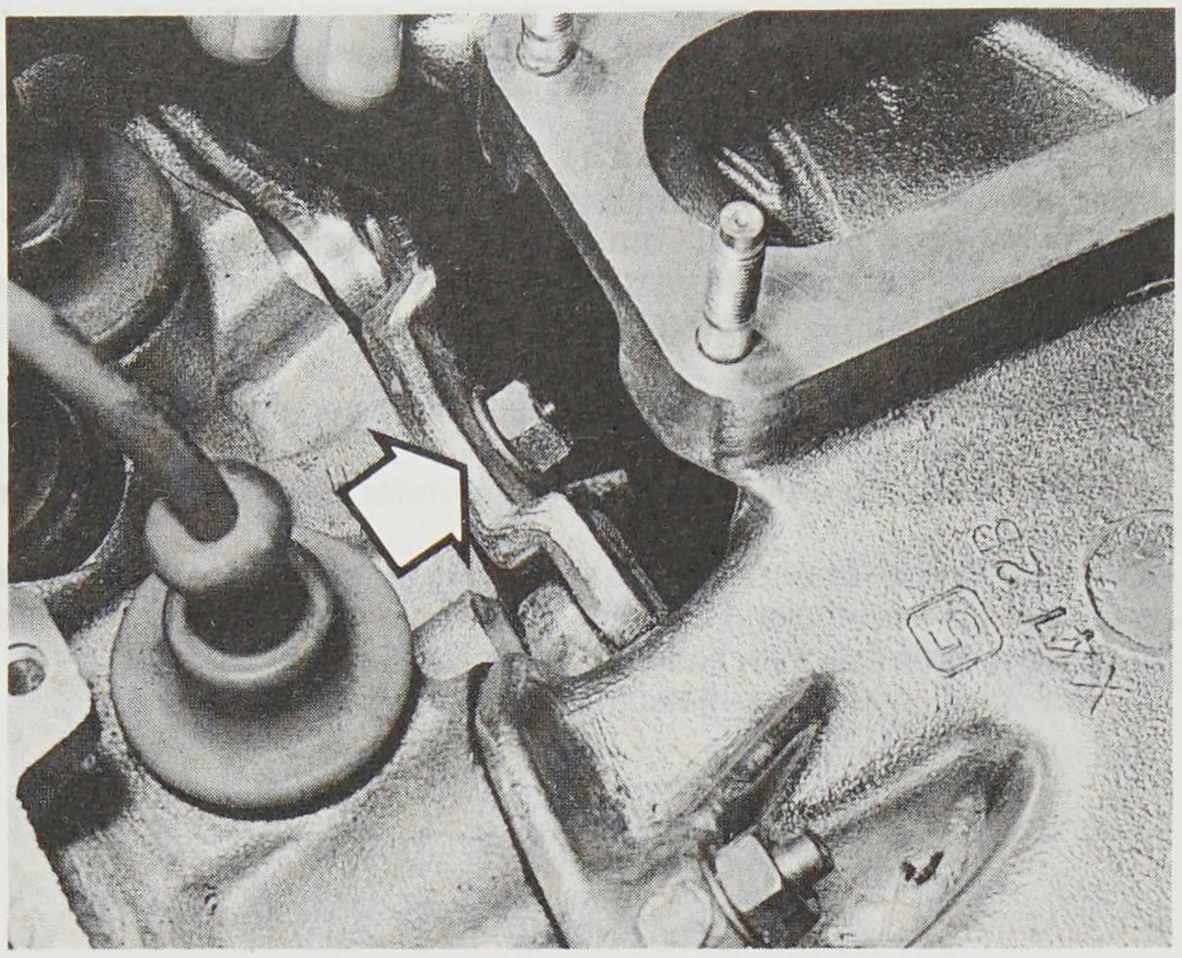
11.1 Accelerator cable connection on throttle quadrant (arrowed)



11.2 Accelerator cable end fitting



11.3 Accelerator cable connection to accelerator pedal (arrowed)



12.5 Inlet manifold centre clamp (arrowed)

14 Air filter element – renewal

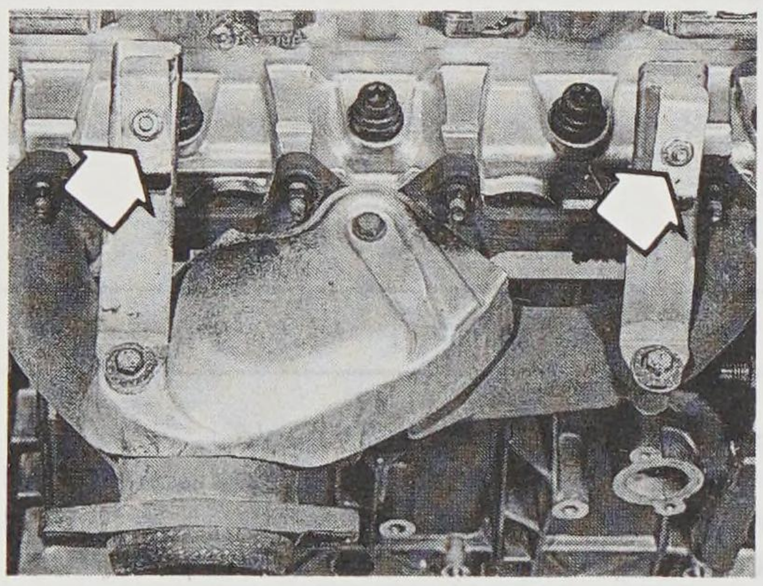
1 Disconnect the air inlet duct from the filter housing to the carburettor at the filter housing end.
2 Release the filter housing top cover clips and lift off the top cover.
3 Remove the air filter. The filter must be renewed at the intervals given in the *'Maintenance and inspection'* section. A blocked filter can cause carburation problems.
4 Refitting is a reversal of removal.

15 Air inlet system – general

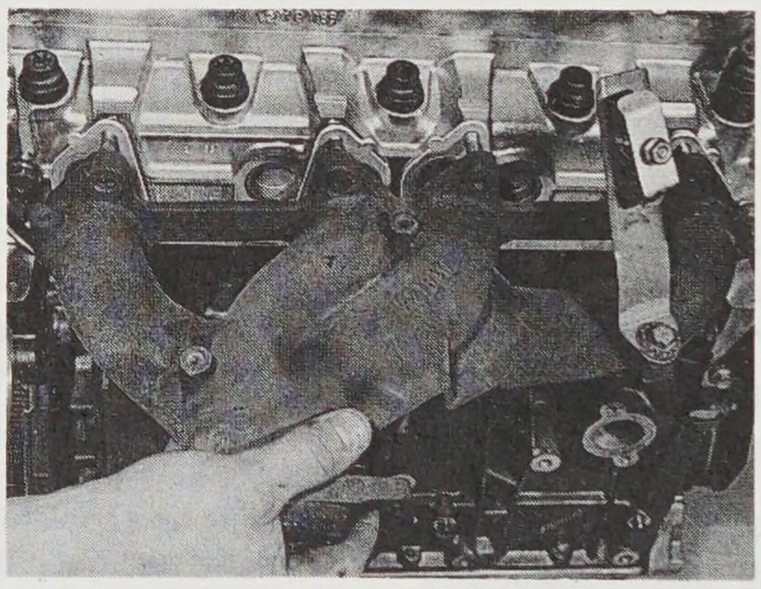
1 Cold air is drawn into the system from the intake duct fitted to the front panel (photo).
2 Hot air is drawn from the collector plate over the exhaust manifold (photo).
3 These two ducts join together at the air inlet mixer housing which contains a control flap operated by wax thermostat (photo).
4 When the engine is cold the thermostat contracts and the control flap closes off the cold air duct and opens the hot air duct. As the air being collected from the exhaust manifold becomes warmer, so the thermostat progressively closes off the warm air duct and opens the cold air duct.
5 If the thermostat should fail, renew the mixer housing.
6 All the ducts are secured by worm drive clips.
7 Additional breather pipes are connected to the air filter housing on certain models.
8 To remove the air filter housing, remove the filter as described in Section 14, then disconnect the air intake duct and any breather hoses attached to the housing.
9 Release the lower clips and lift out the housing.
10 Refit in reverse order.

16 Fuel pump – removal and refitting

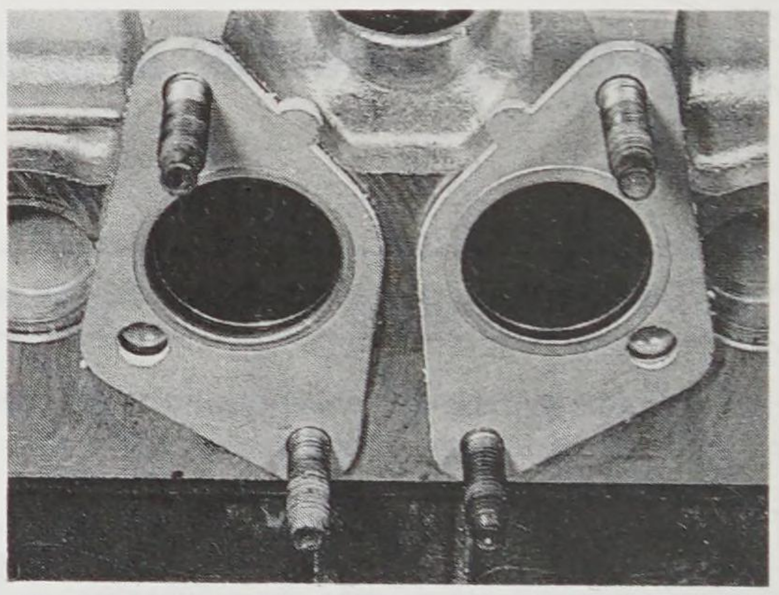
1 A mechanical fuel pump driven by eccentric cam from the camshaft is mounted on the distributor end of the cylinder head.
2 To remove the pump, disconnect the inlet and outlet fuel pipes (refer to Section 8). Note that the unions on the pump are marked with arrows to denote the inlet from the fuel tank and the outlet to the carburettor.
3 Remove the two nuts securing the pump to the cylinder head and lift off the pump (photo).
4 The pump is a sealed unit and if defective must be renewed.
5 Refit in reverse order.



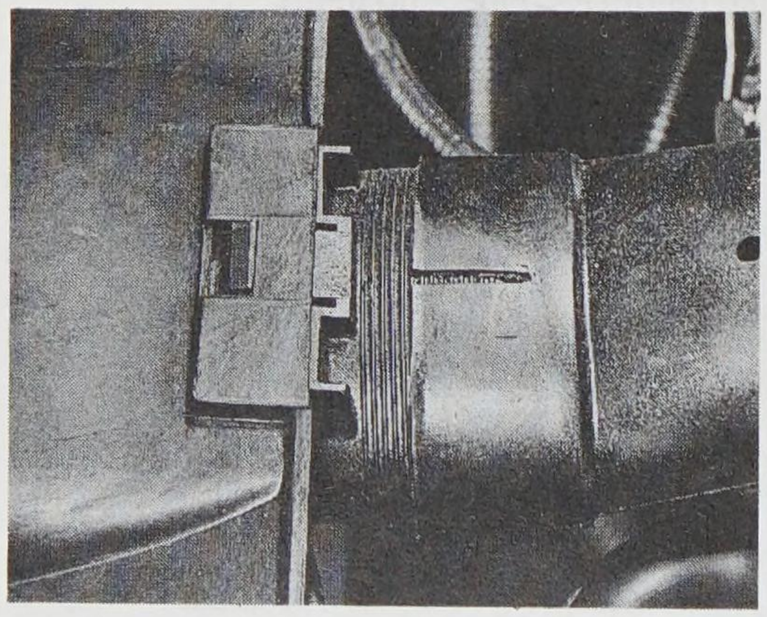
13.2 Power-assisted steering and coolant pipe clamps (arrowed) – fuel injection model shown



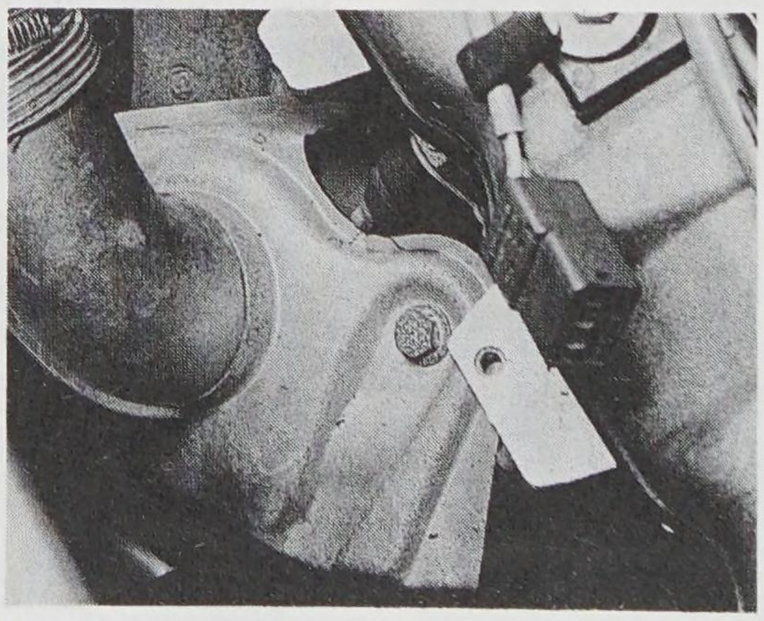
13.4 Removing the exhaust manifold



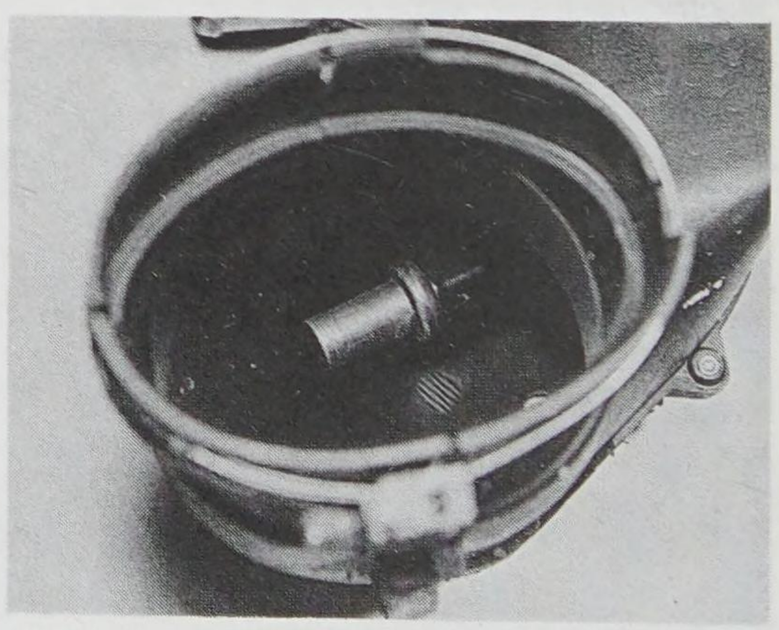
13.5 New gaskets fitted to exhaust ports on cylinder head



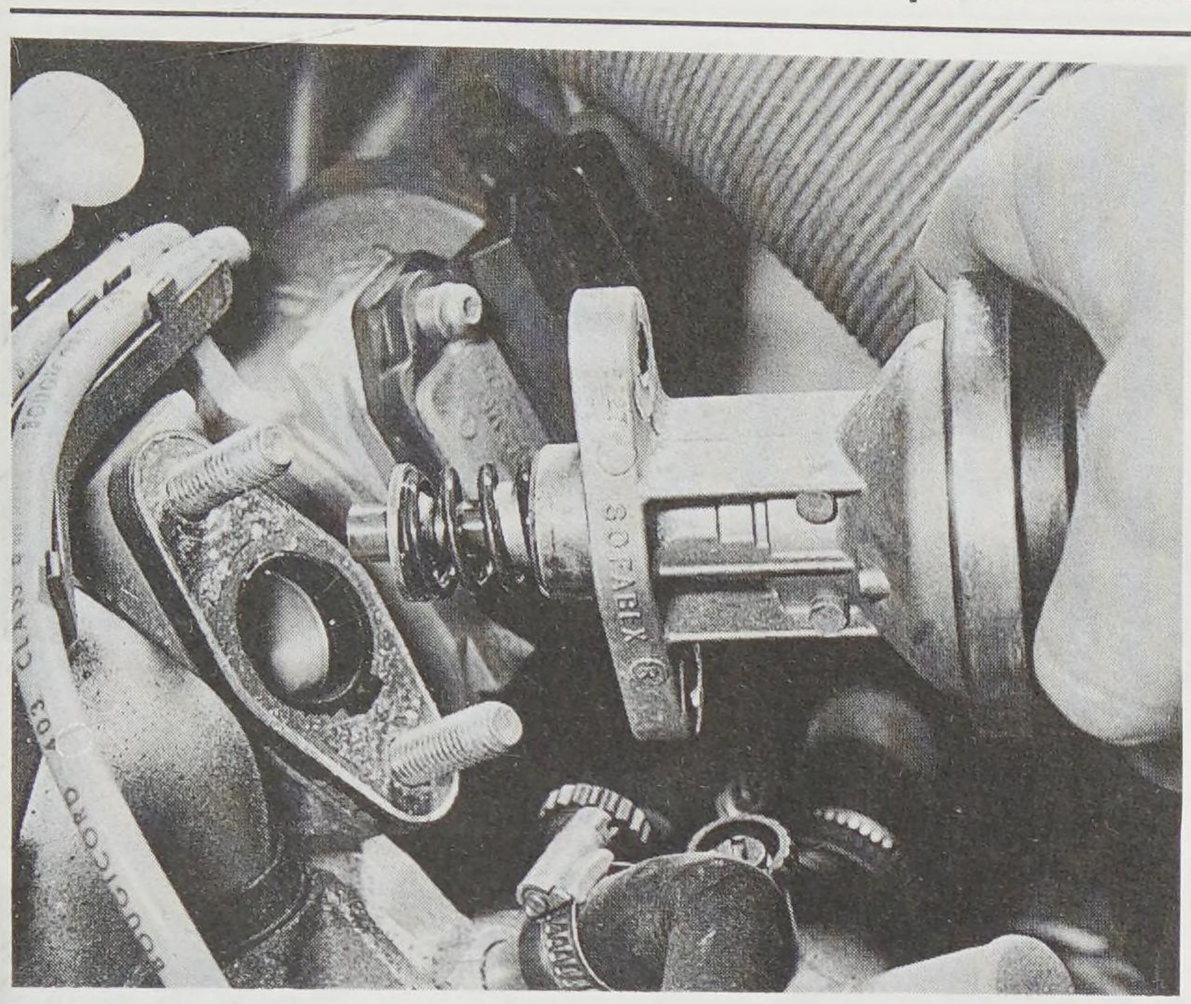
15.1 Cold air intake duct on front panel



15.2 Hot air collector plate on exhaust manifold



15.3 Wax thermostat on air inlet mixer housing



16.3 Lifting off the fuel pump

17 Fuel filter – renewal

1 The fuel filter is connected into the fuel hose between the pump and the carburettor (photo).
2 Disconnect the hose connections (see Section 8) and remove the filter.
3 Fit a new filter in reverse order, ensuring any directional arrows are pointing in the direction of fuel flow.
4 At the same time as filter renewal, check the fuel reservoir tank on the side of the carburettor for sediment. Remove the reservoir (see Section 19) as necessary for cleaning.
5 The fuel connections on the reservoir are as follows:

Top hose – return to tank
Middle hose – supply from pump through filter
Lower hose – to carburettor inlet

18 Carburettor – idle speed and mixture adjustment

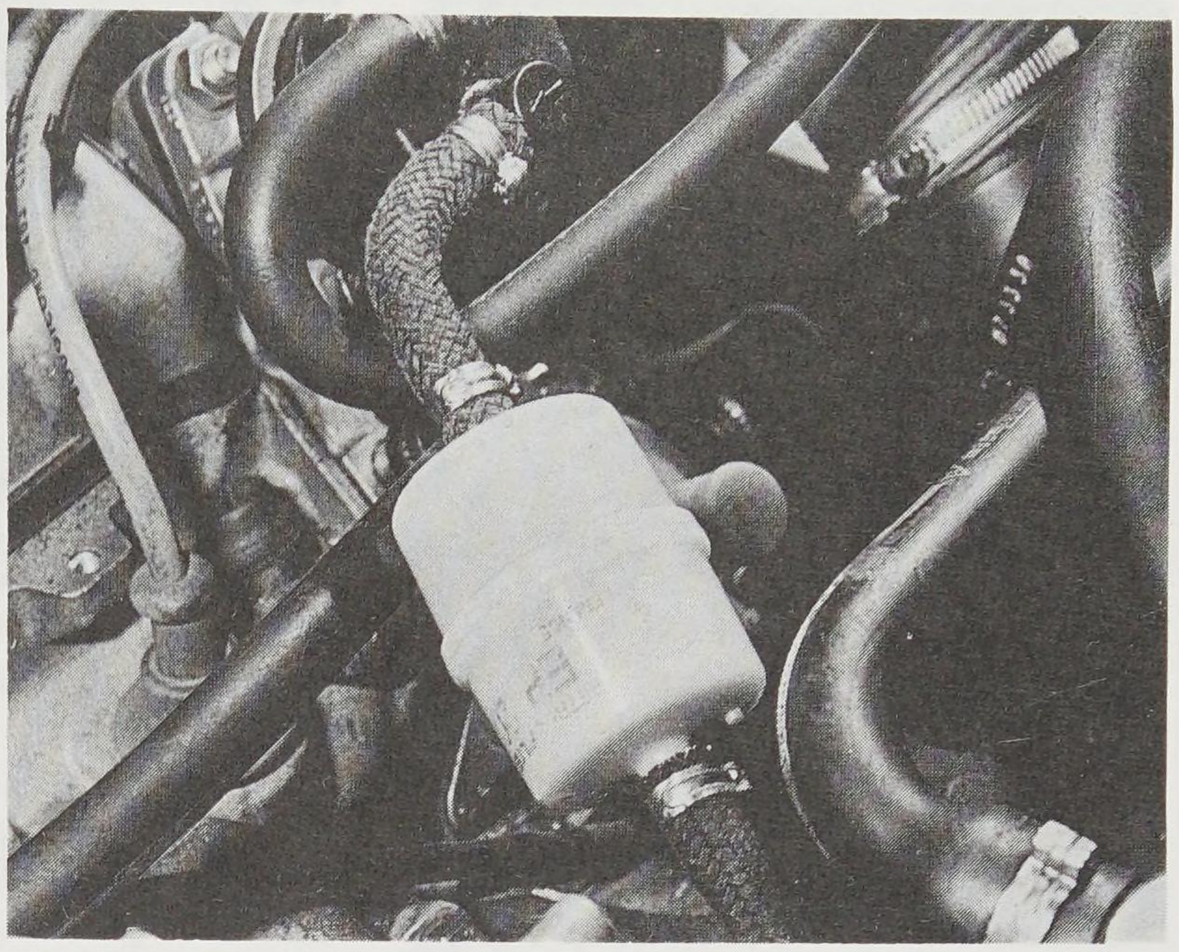
1 Before attempting to adjust the idle speed or mixture (CO), ensure the ignition system is in good condition and correctly adjusted.
2 The engine must be hot, the electric cooling fan having cut in at least once.
3 The air filter element must be fitted.
4 The tamperproof plug on the mixture screw must be removed. **Note**: *Before removing the plug, ensure that any adjustment made will not contravene exhaust emission control laws.*
5 On vehicles without a tachometer, an external tachometer must be fitted according to the manufacturer's instructions.

Adjustment without an exhaust gas analyser

6 Start and run the engine as described in paragraph 2 above, then allow it to idle.
7 Turn the idle speed adjustment screw (clockwise to increase and anti-clockwise to decrease) to obtain the specified idle speed (photo).
8 Turn the idle mixture adjustment screw to obtain the highest engine speed possible (photo). (Clockwise to decrease and anti-clockwise to increase.)
9 Re-adjust the idle speed to that specified using the idle speed adjustment screw.
10 Repeat paragraphs 8 and 9 until no further increase in speed using the mixture screw is possible.
11 Stop the engine, remove all test equipment and fit a new tamperproof plug to the mixture screw.

Adjustment using an exhaust gas analyser

12 Connect the exhaust gas analyser in accordance with the manufacturer's instructions and a tachometer as described in paragraph 5.



17.1 Fuel filter

13 Start and run the engine as described in paragraph 2, then allow the engine to idle.
14 Adjust the mixture screw to obtain the specified CO content reading.
15 Adjust the idle speed screw to obtain the specified idle speed.
16 Recheck the CO content and re-adjust as necessary.
17 Stop the engine, remove all test equipment and fit a new tamperproof plug to the mixture screw.

Idle compensation device

18 On vehicles fitted with an idle compensation device (those with air conditioning) adjust the idle speed using the screw on the compensation device. The air conditioning compressor must be running during this adjustment.

19 Carburettor – removal and refitting

1 Using an Allen key, unscrew the bolt securing the air inlet duct to the carburettor, loosen the clip and disconnect the duct (photo).
2 Disconnect the accelerator cable from the throttle quadrant (Section 11).
3 Disconnect the distributor vacuum pipe (photo).
4 Disconnect the float chamber breather pipes. The upper pipe connects with the air filter housing (photo).

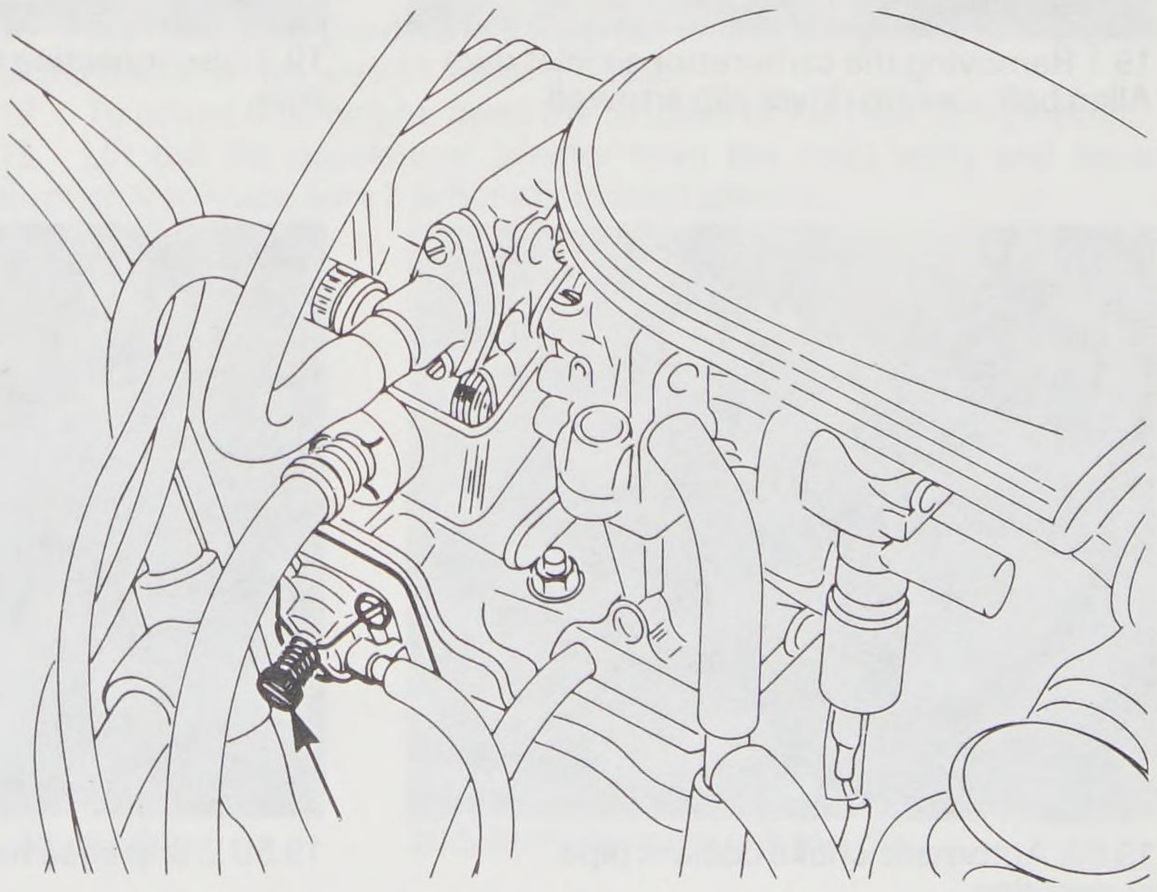
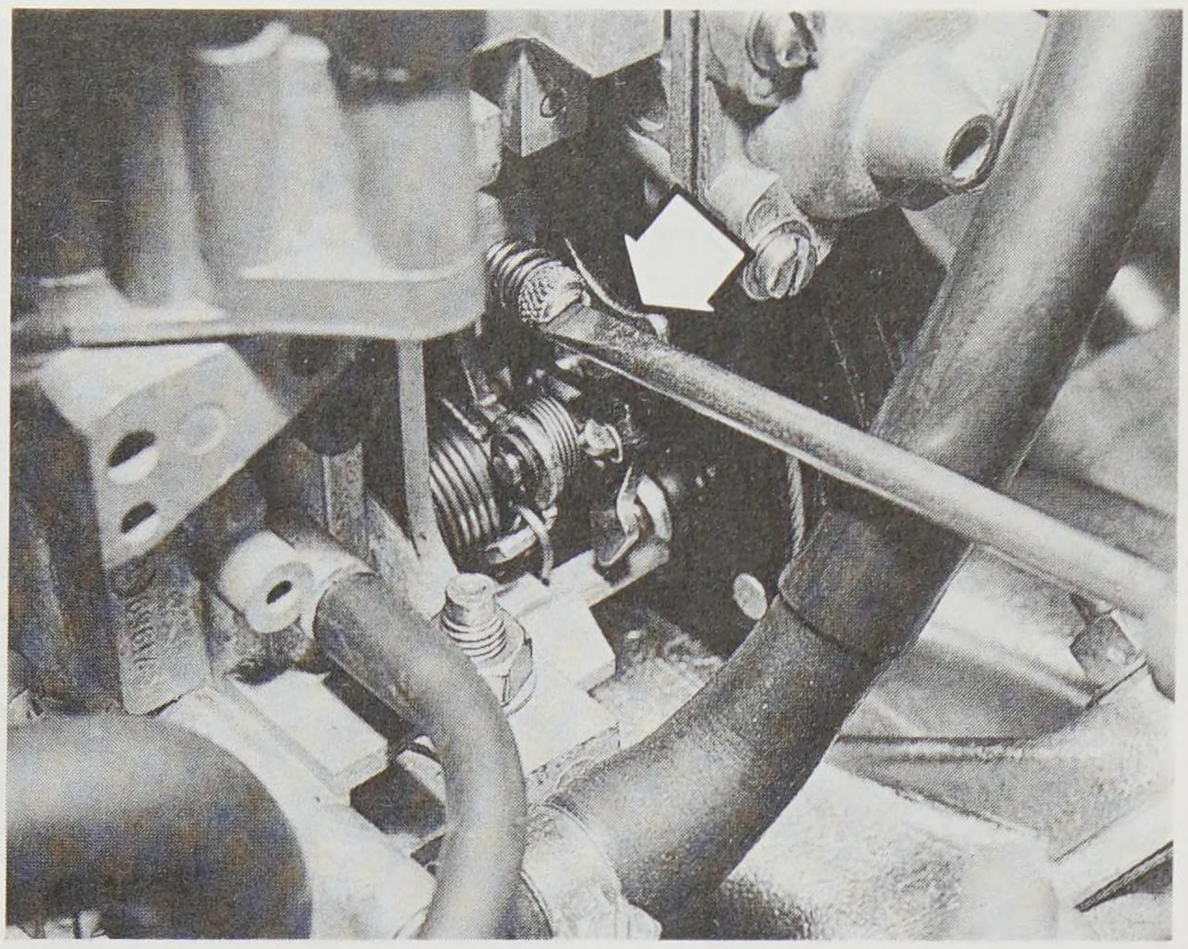
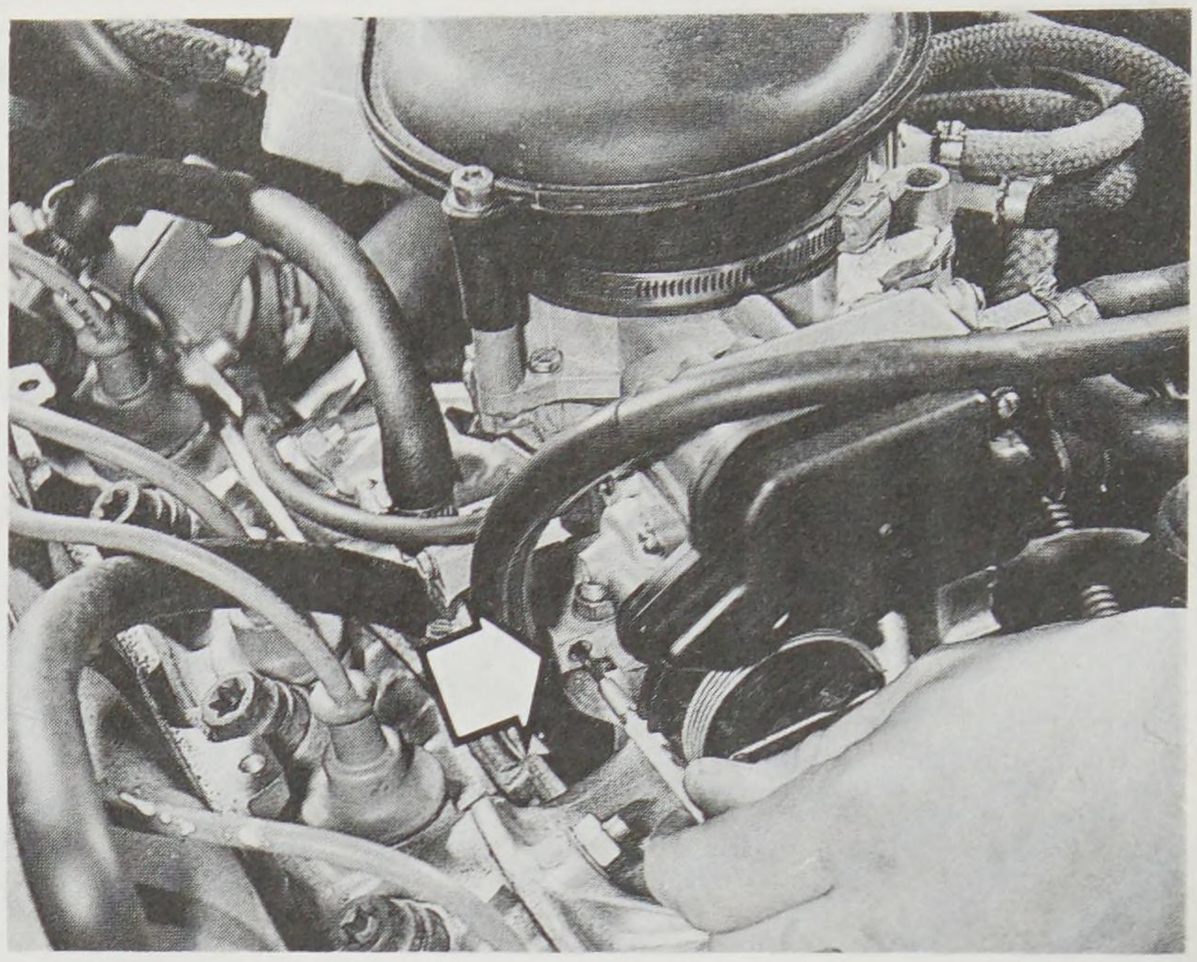


Fig 3.4 Idle speed adjustment screw (arrowed) on vehicles with idle compensation (Sec 18)



18.7 Idle speed adjustment screw (arrowed)



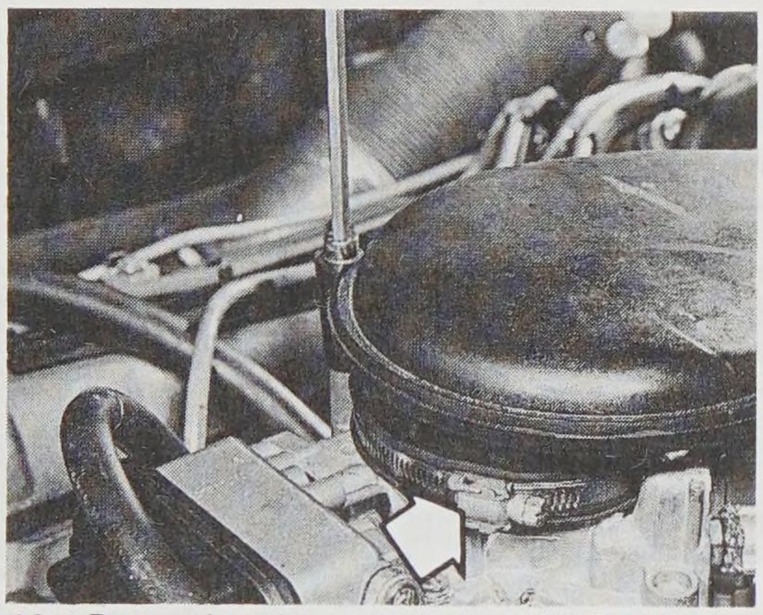
18.8 Idle mixture adjustment screw (arrowed)

5 Either drain down the cooling system or clamp the automatic choke and carburettor base heating pipes, then disconnect the pipes (photos).
6 Disconnect the float chamber solenoid valve wiring (photo).
7 Disconnect the fuel inlet pipe either at the fuel pump or the fuel reservoir on the side of the carburettor and blank off the hose.
8 Remove the carburettor securing nut and lift off the fuel reservoir (photo).
9 Remove the remaining carburettor securing nuts and lift off the carburettor (photos).
10 If it is perished or cracked, remove the carburettor spacer and renew it (photo).
11 Refitting is a reversal of removal; adjust the accelerator cable as described in Section 11.

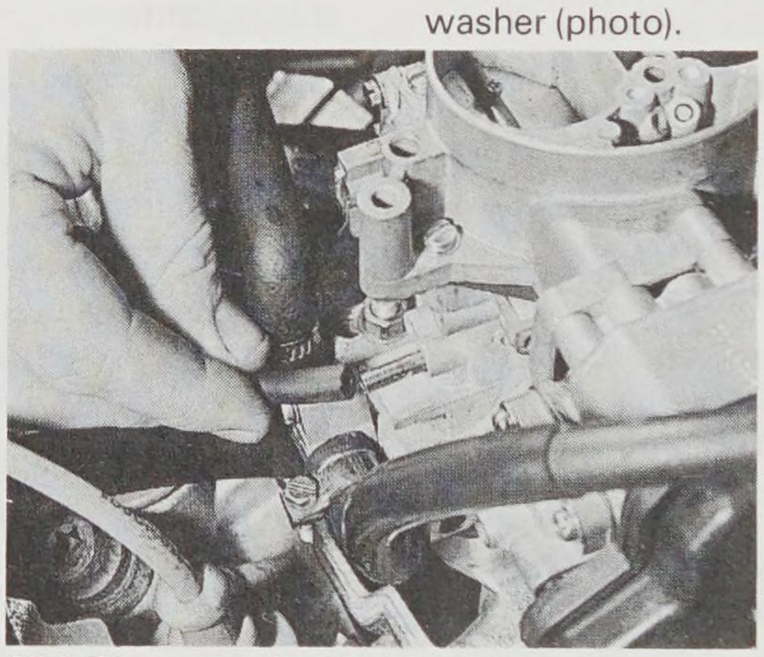
20 Carburettor – overhaul

Note: *Special gauges are needed to adjust the throttle valves and automatic choke. Without these gauges do not attempt to adjust the primary (Fig. 3.5) or secondary barrel throttle adjuster screws. Similarly, the float height is set using a special gauge, but the dimensions of the gauge are given, and an alternative method also described*

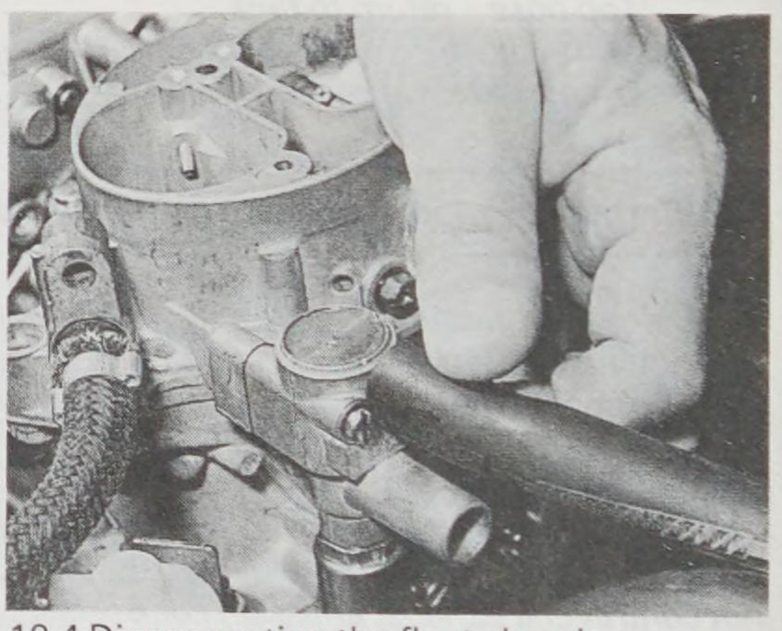
1 Remove the carburettor as described in Section 19.
2 Thoroughly clean the carburettor in solvent and dry it off before placing on a clean bench.
3 Undo the fuel inlet union and remove the filter mesh for cleaning. Wash the filter in clean petrol, then refit the union using a new sealing washer (photo).



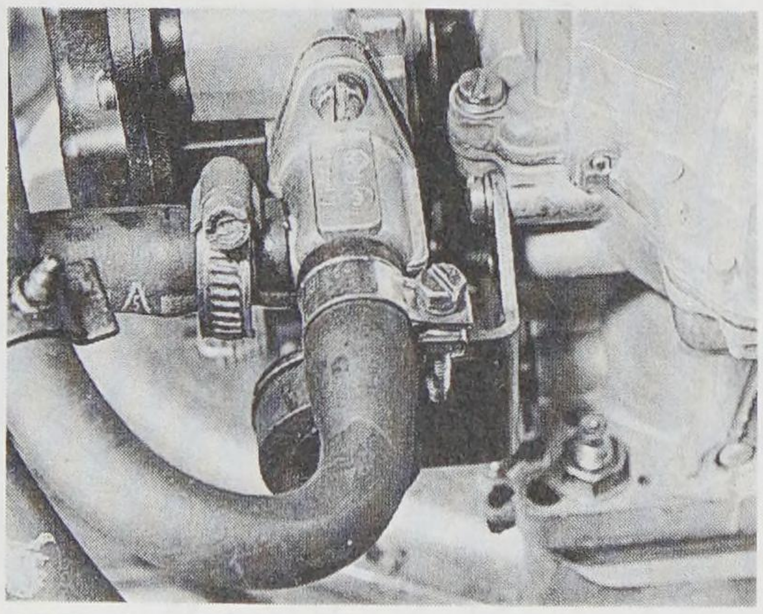
19.1 Removing the carburettor air inlet duct Allen bolt – worm driver clip arrowed



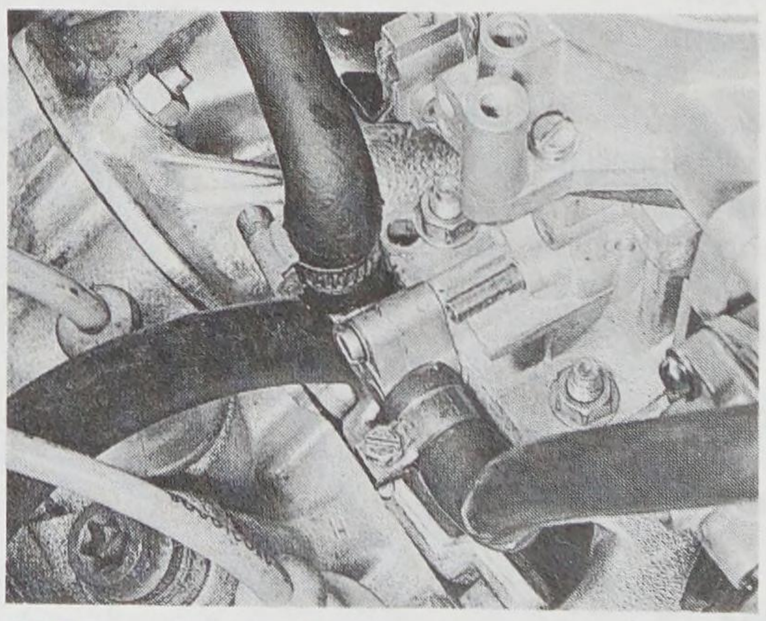
19.3 Disconnecting the distributor vacuum pipe



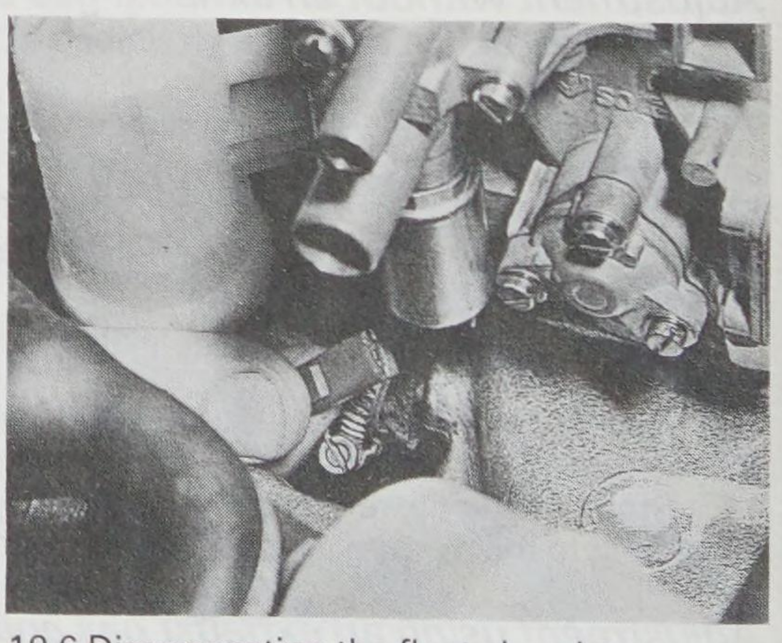
19.4 Disconnecting the float chamber breather pipe



19.5A Automatic choke coolant pipe connection ...

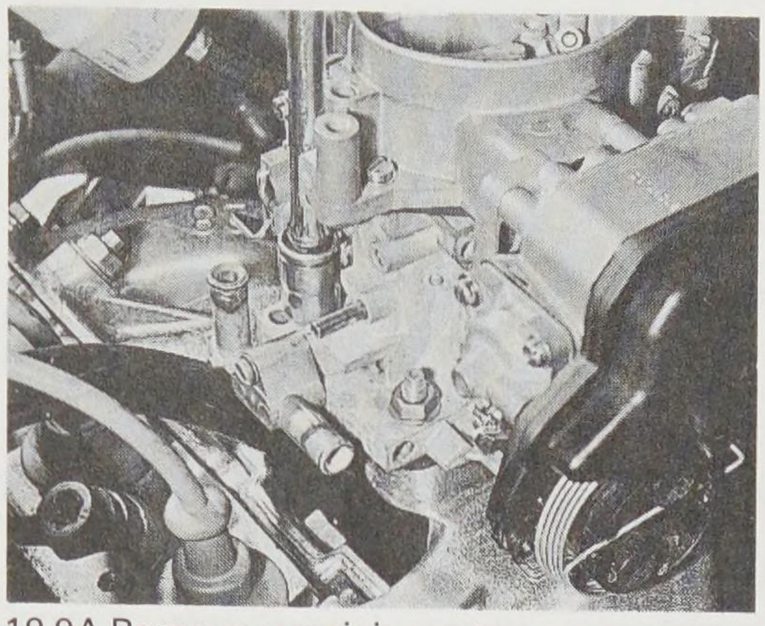


19.5B ... and base heating pipes

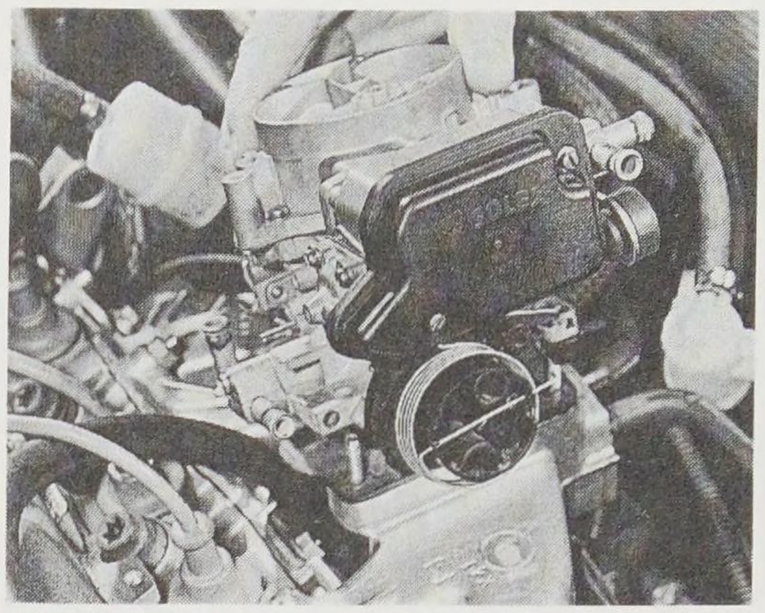


19.6 Disconnecting the float chamber breather solenoid wiring

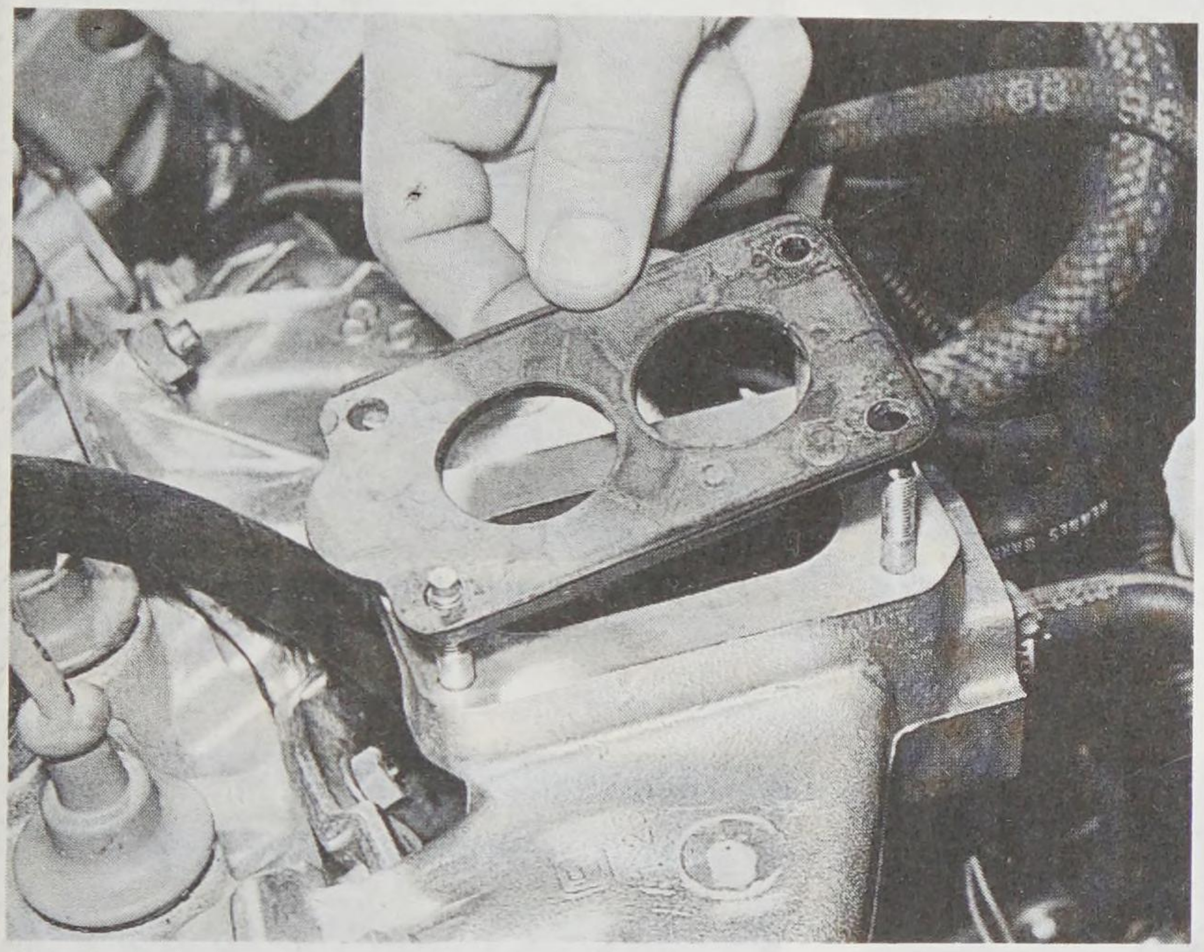
19.8 Lifting off the fuel reservoir



19.9A Remove remaining nuts ...



19.9B ... and lift off the carburettor



19.10 Removing carburettor spacer

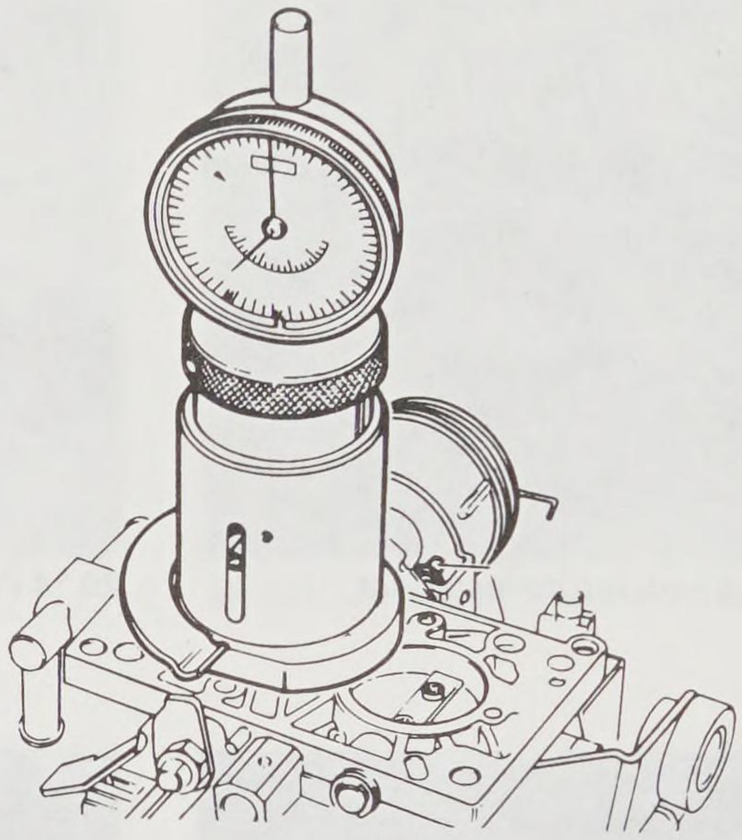
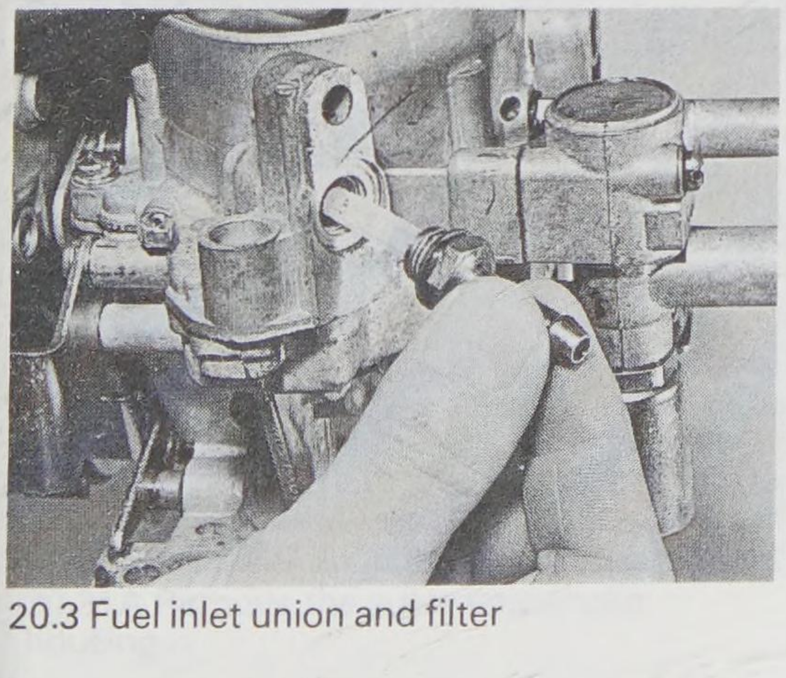
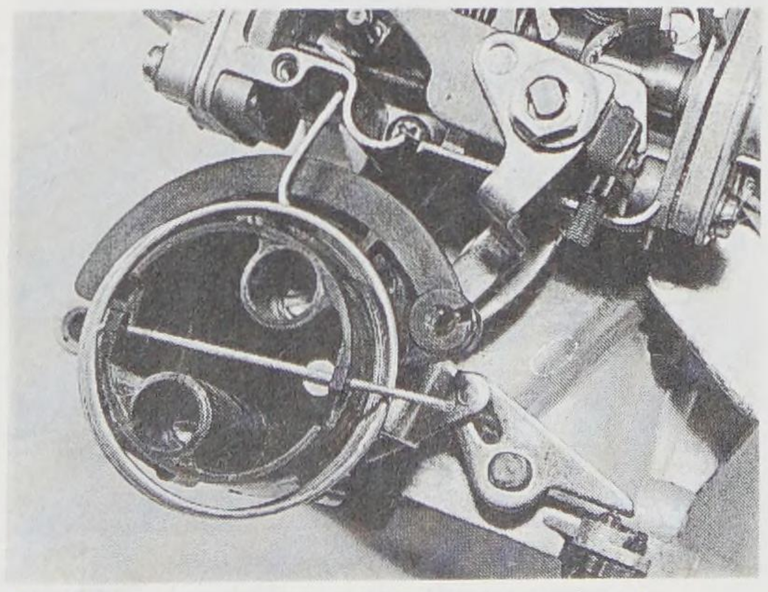


Fig 3.5 Throttle valve adjustment gauge (Sec 20)

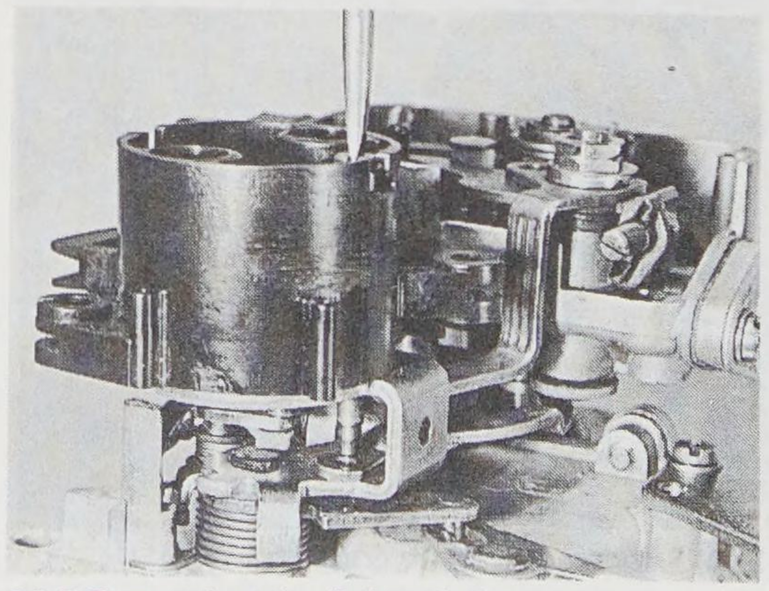
4 Remove the throttle return spring noting how it is located on the quadrant (photo).
5 Unscrew the link rod pin (photo).
6 Remove the top cover screws and lift off the cover (photos).
7 Tap out the pivot pin and lift off the floats.
8 Unscrew the needle jet.
9 Clean out the float chamber in the main body.
10 Blow through the needle jet and check that the needle is free to move. If it is sticky, renew the jet.
11 Shake the floats to ensure they are not holed and full of fuel. Renew them if this is the case.
12 Refit the needle valve using a new sealing washer (photo).
13 Ensure that no trace of old gasket remains on the top cover or main body, then fit a new gasket to the top cover (photo).
14 Fit the floats, pushing in the pivot pin until it protrudes equally at both ends (photo).
15 To check float height, use the gauge as depicted in Figs. 3.6 and 3.7. The floats should just make contact with the gauge. Note that the gasket must be fitted.
16 We measured the distance from the face of the gasket to the apex of the floats, which was 41.0 mm (photo).
17 To adjust float height, bend the tongues of the float arm (photo).
18 Lift out the accelerator injector from the main body and blow through it to make sure it is not obstructed (photo).



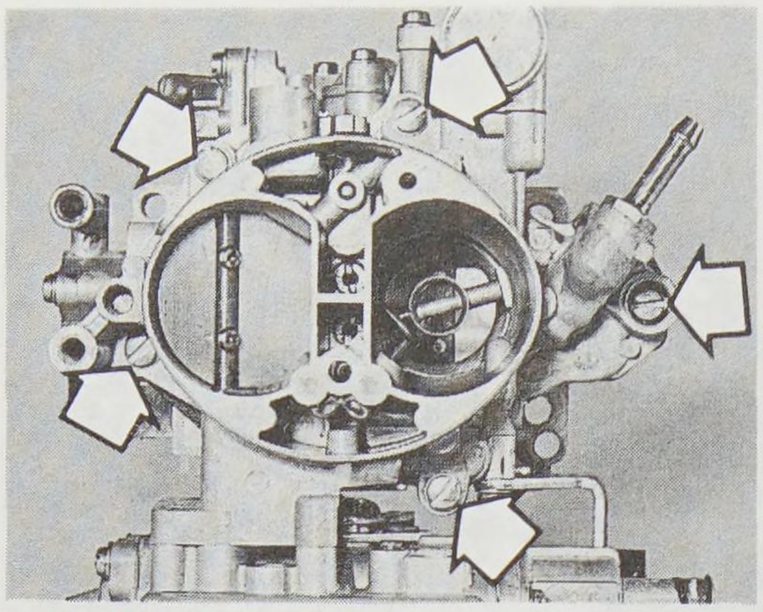
20.3 Fuel inlet union and filter



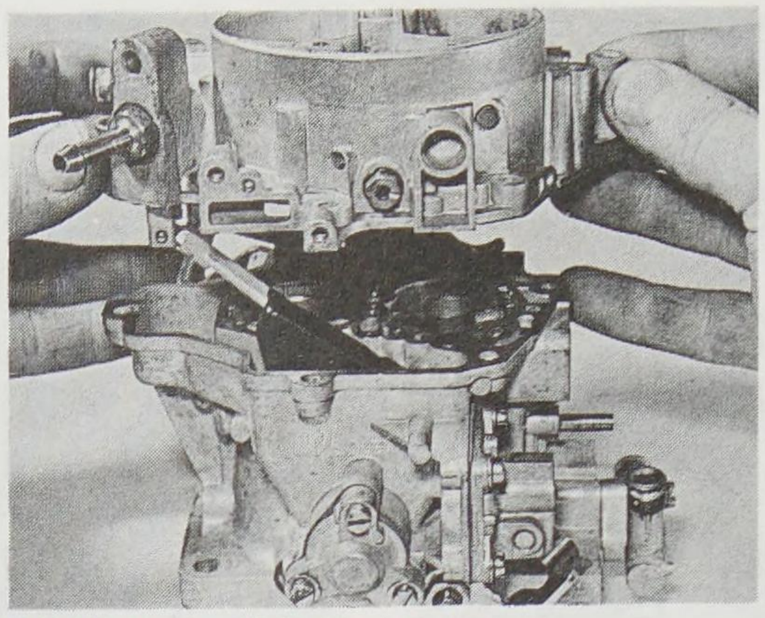
20.4 Throttle return spring on quadrant



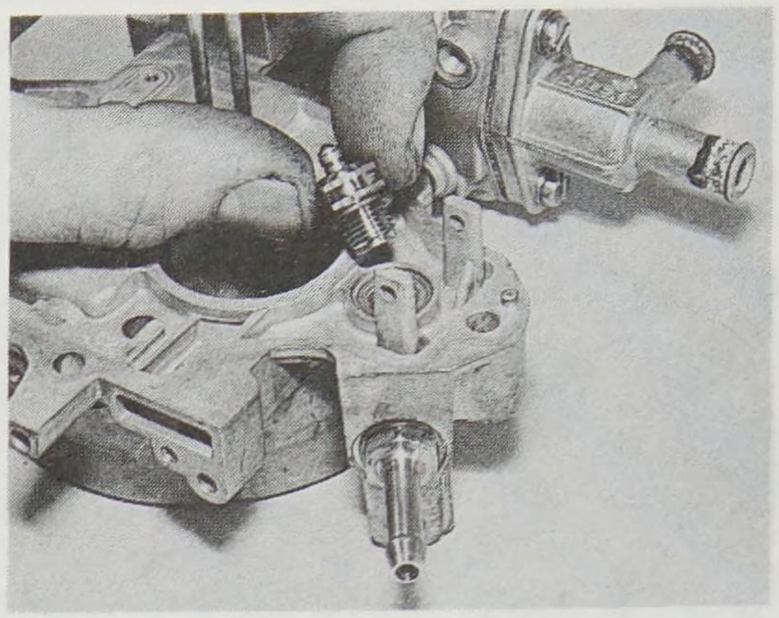
20.5 Removing the link rod pin



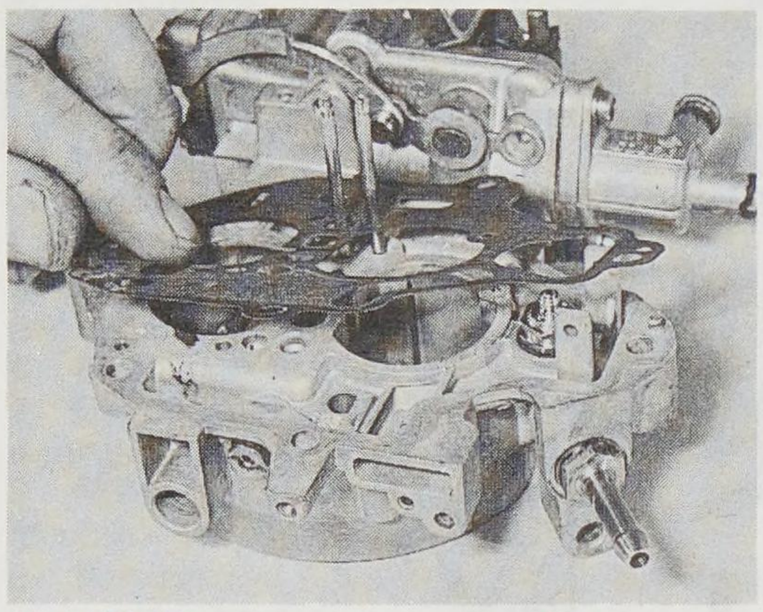
20.6A Carburettor top cover screws (arrowed)



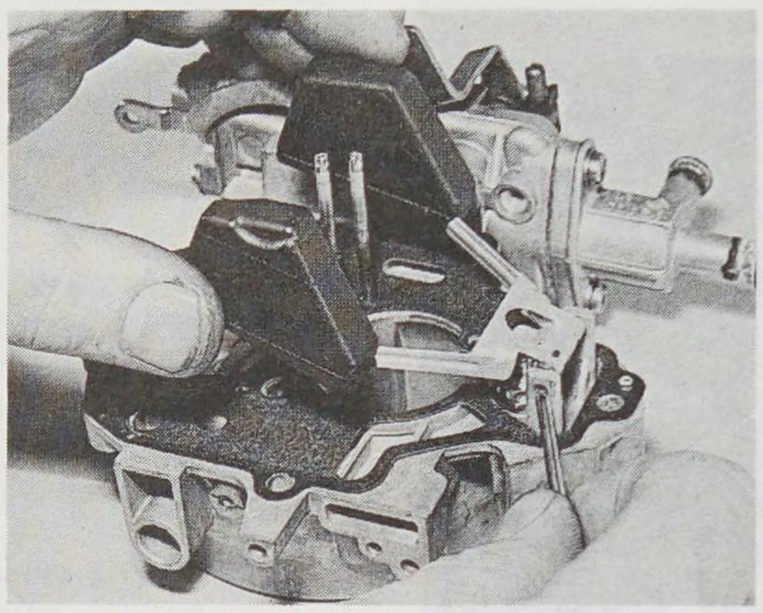
20.6B Lifting off the top cover



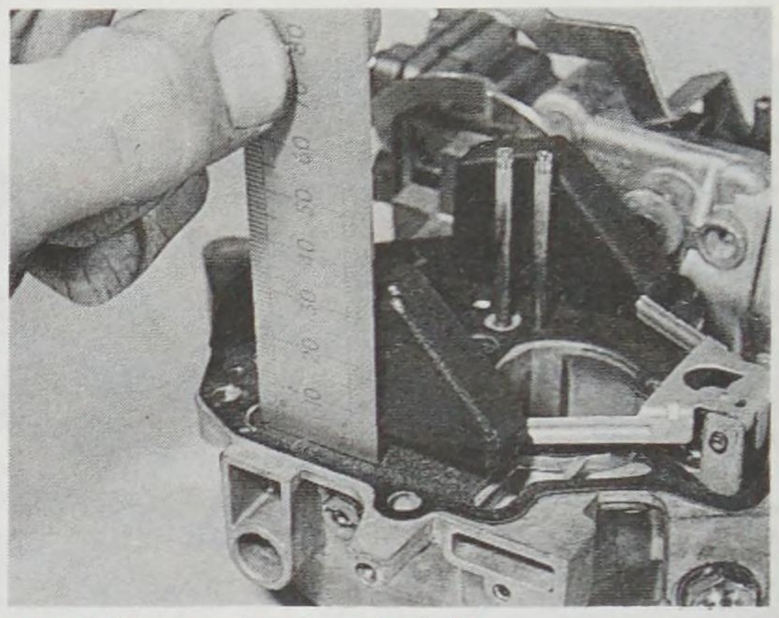
20.12 Fitting the needle valve



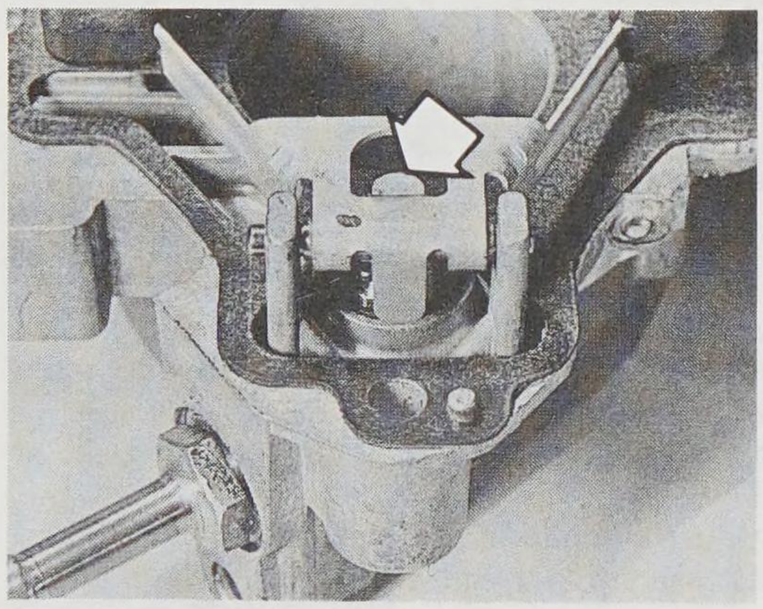
20.13 Fitting a new top cover gasket



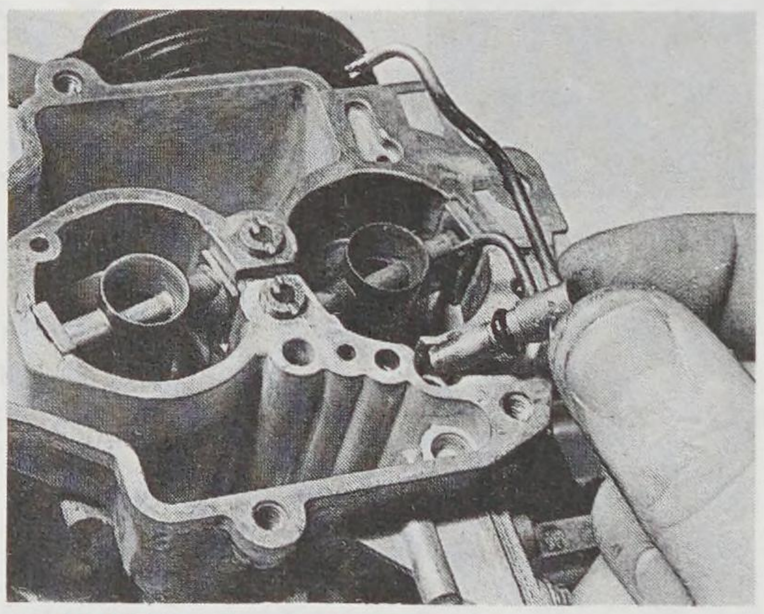
20.14 Pushing in the float pivot pin



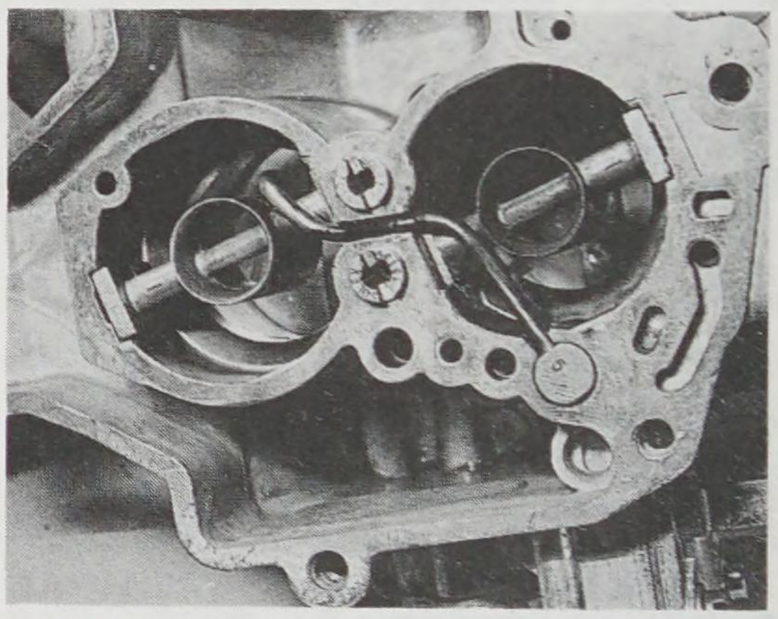
20.16 Measuring float height



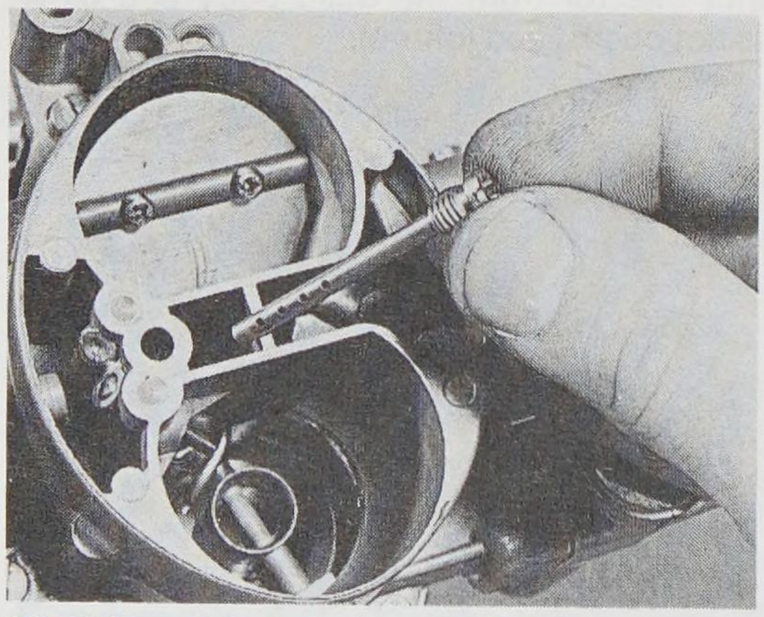
20.17 Float arm tongue (arrowed)



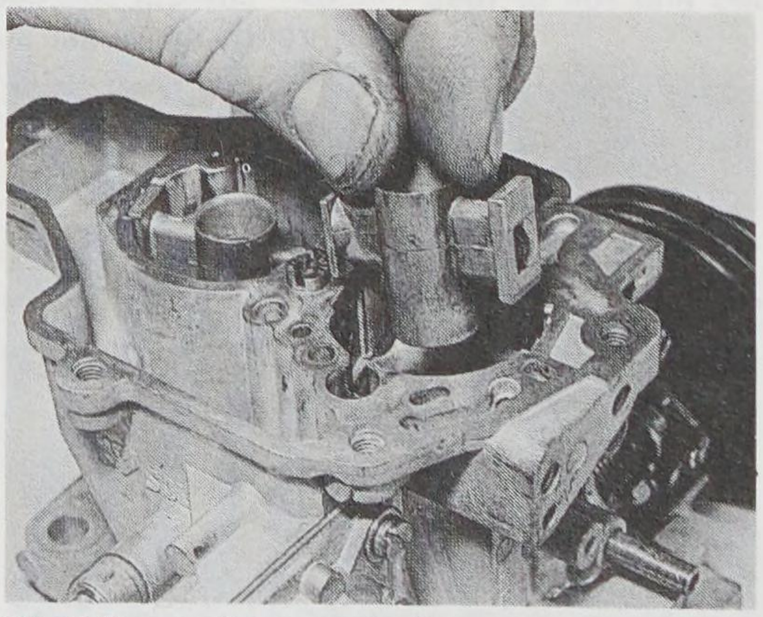
20.18 Lifting out accelerator injector



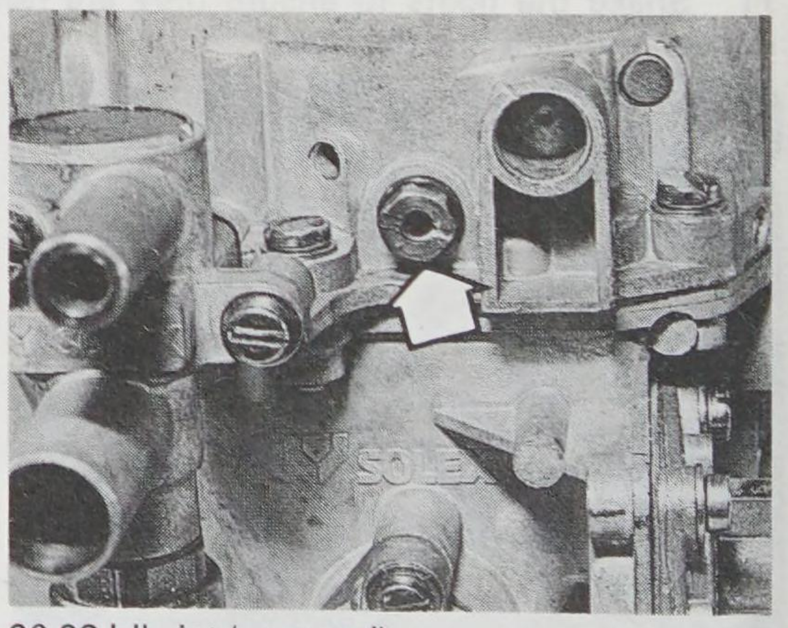
20.19 Accelerator injector correctly fitted



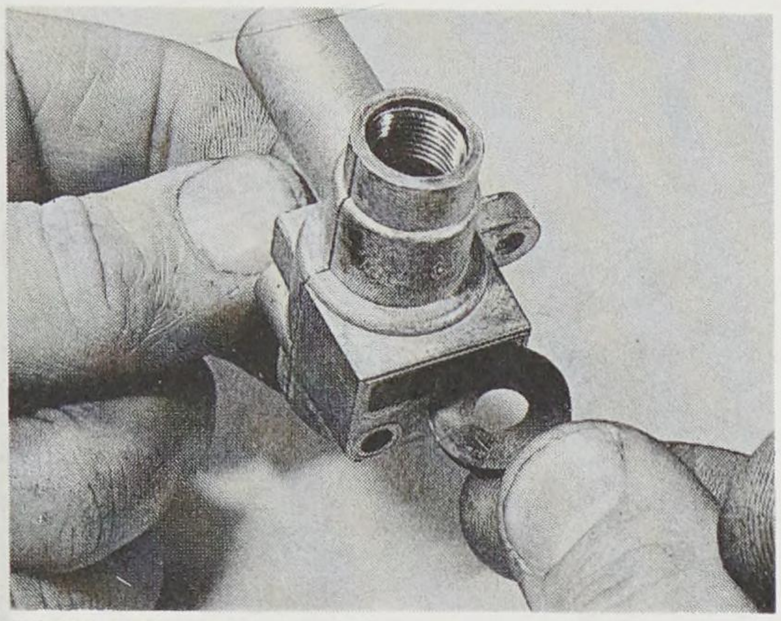
20.20 Removing an air correction jet



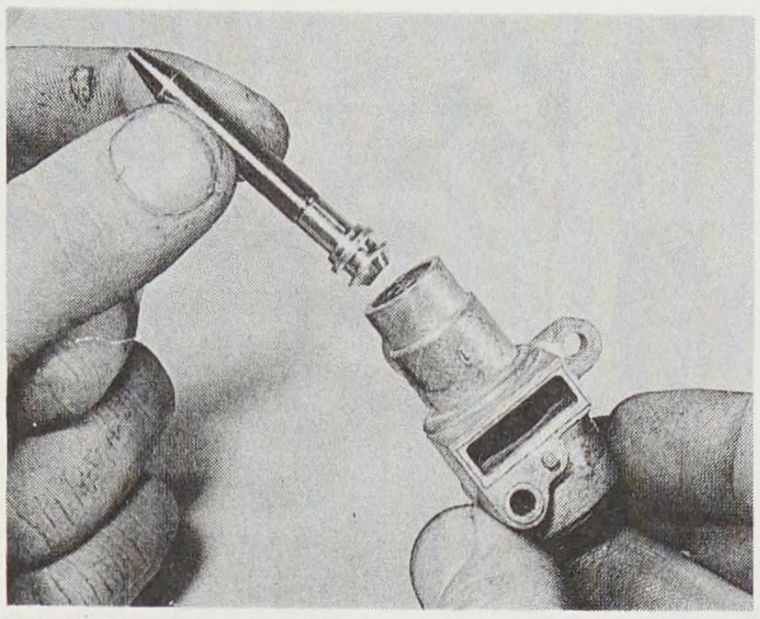
20.22 Removing a venturi



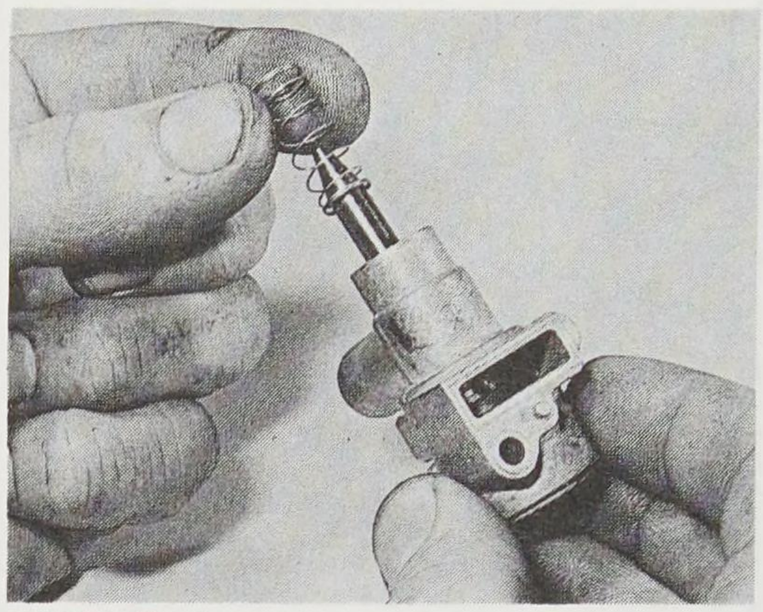
20.23 Idle jet (arrowed)



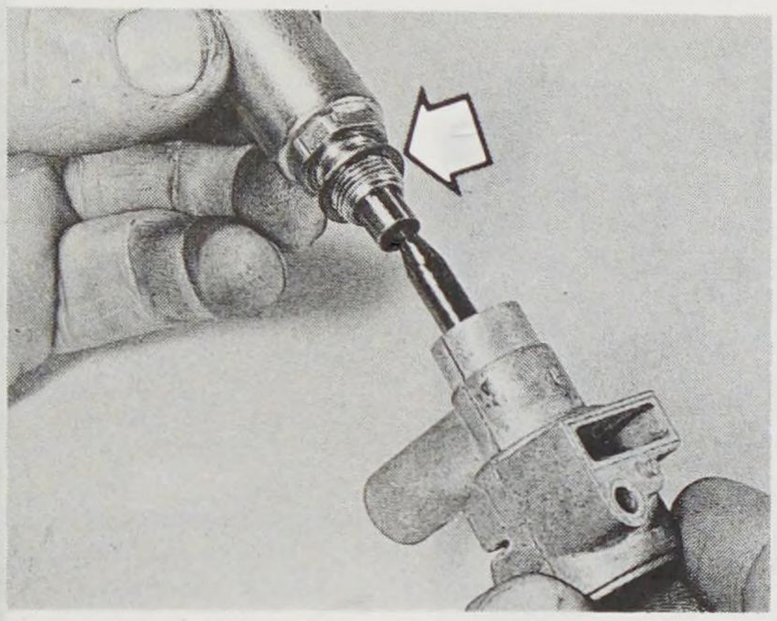
20.26A Fit a new washer ...



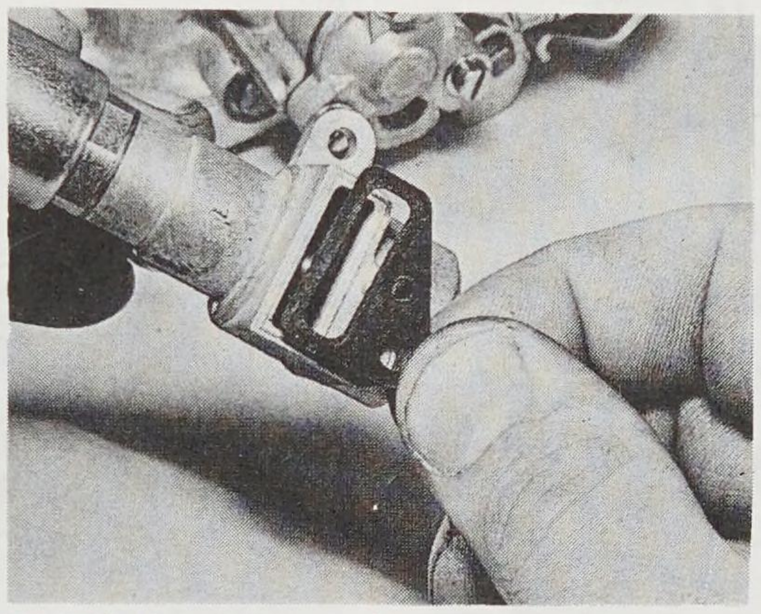
20.26B ... then insert the needle



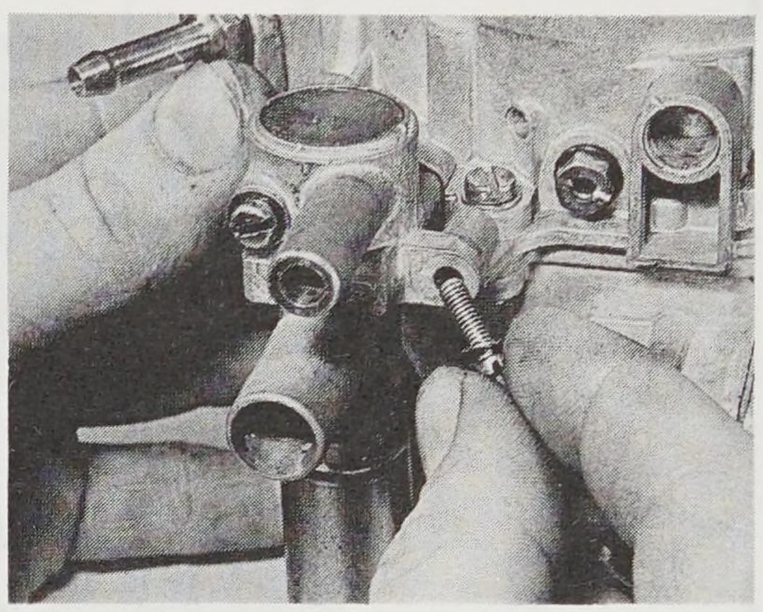
20.27A Fit the spring ...



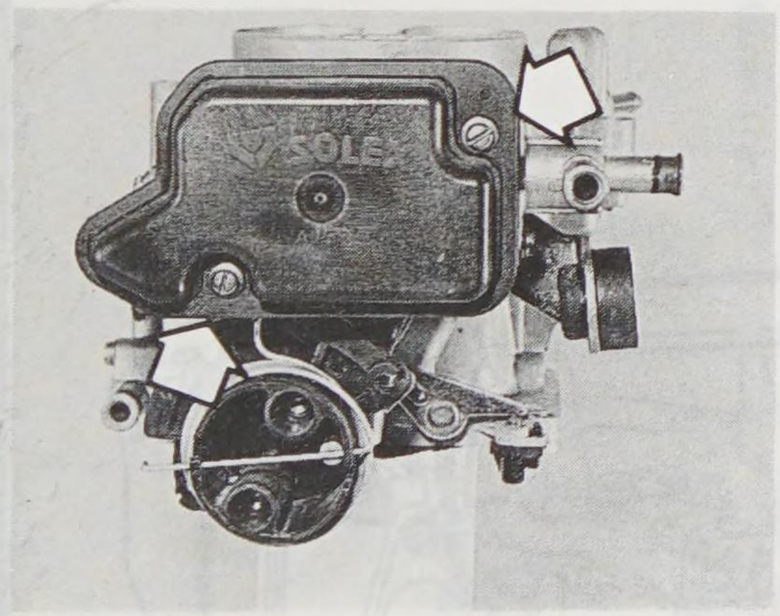
20.27B ... and screw on the solenoid ensuring that the washer (arrowed) is in place



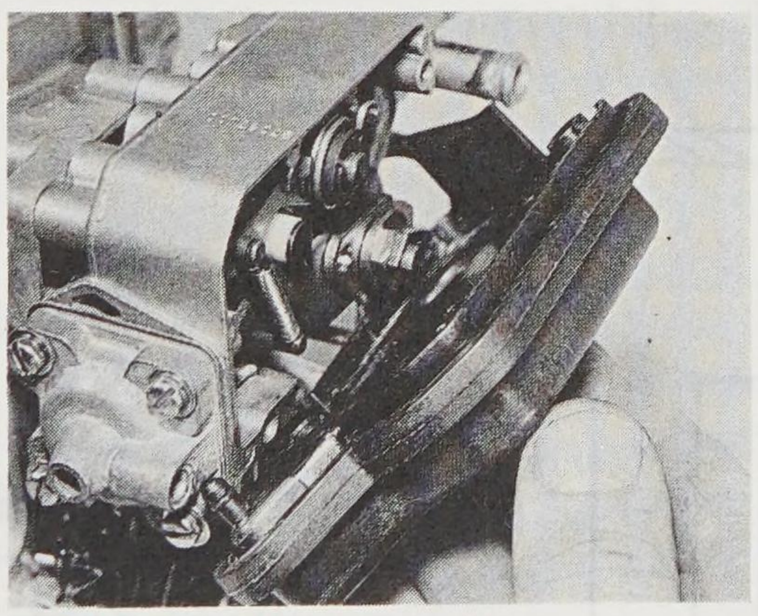
20.28A Use a new gasket ...



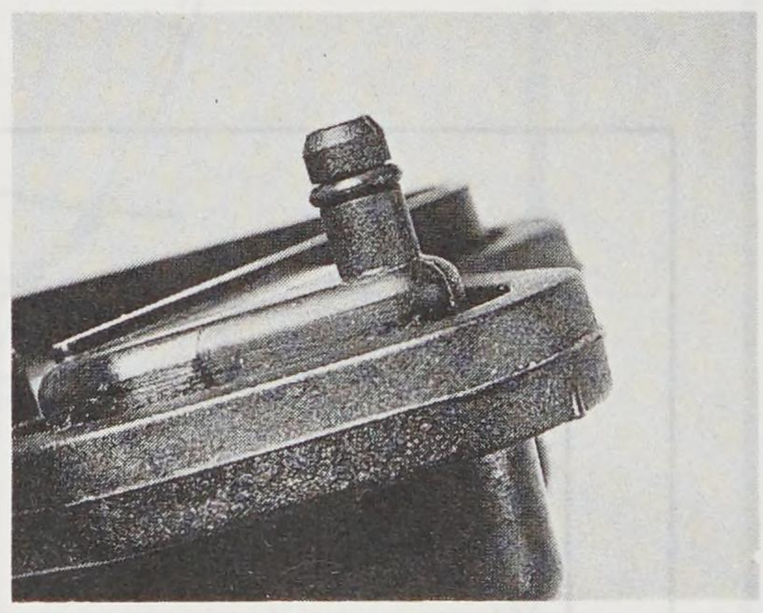
20.28B ... when refitting the valve



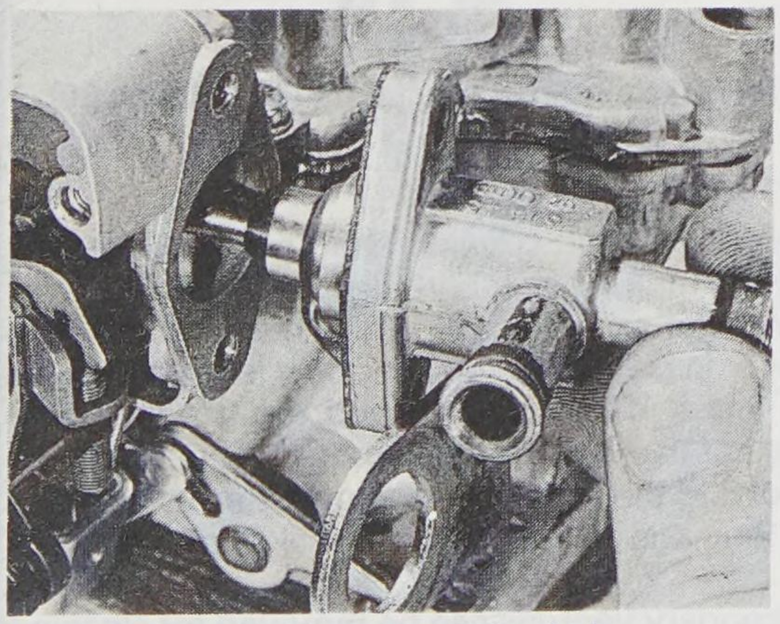
20.29A Vacuum reservoir securing screws (arrowed)



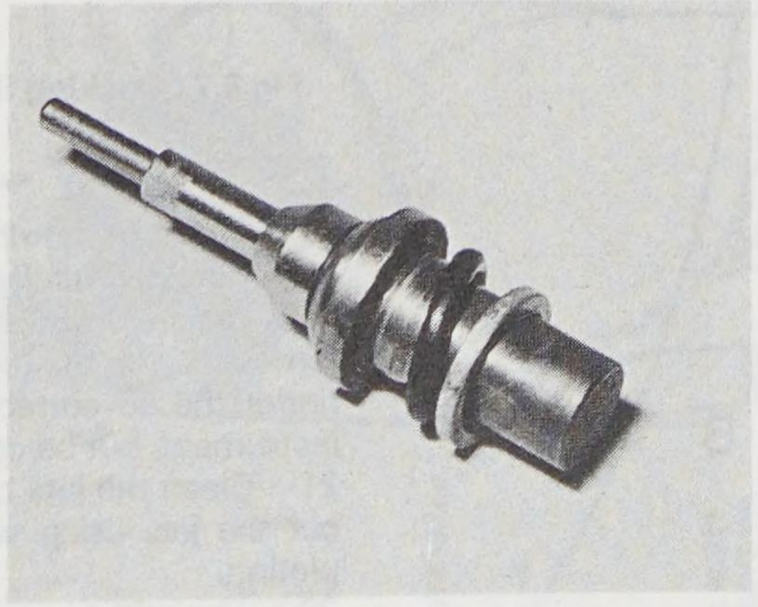
20.29B Lifting off the reservoir



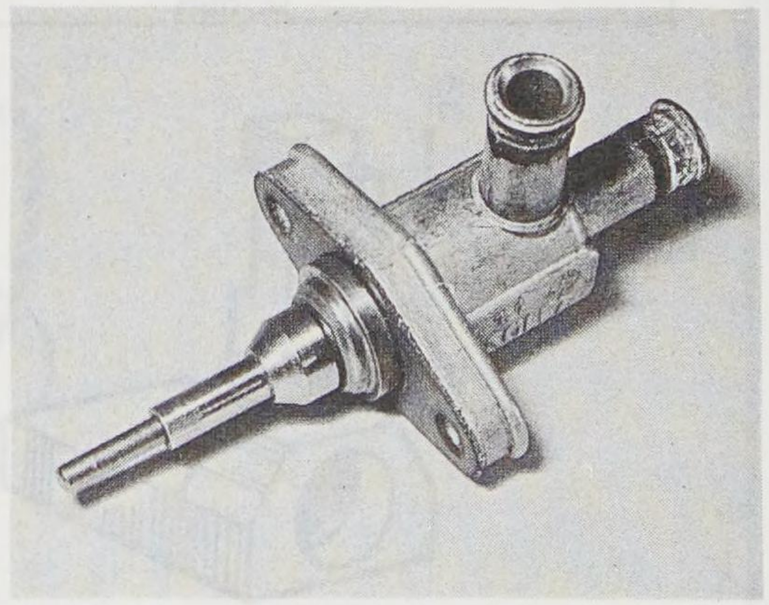
20.30 Reservoir O-ring seal



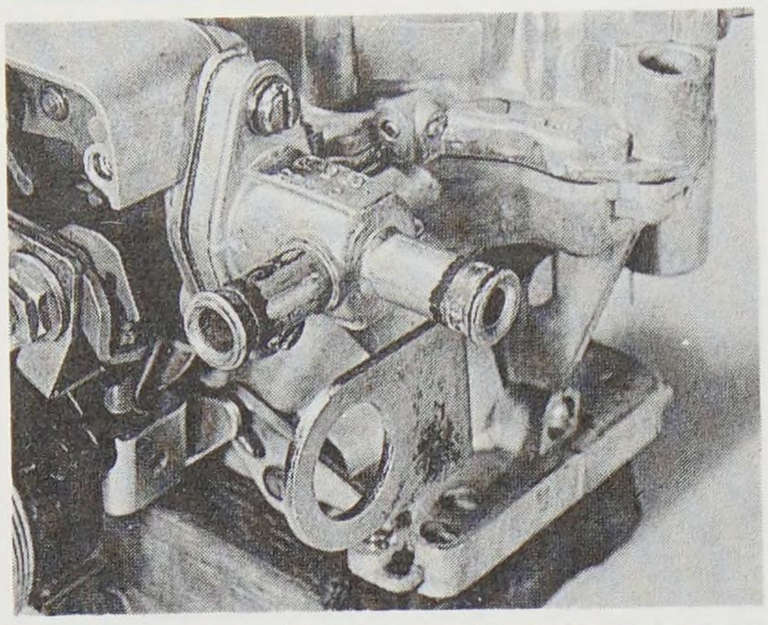
20.31A Remove the automatic choke housing ...



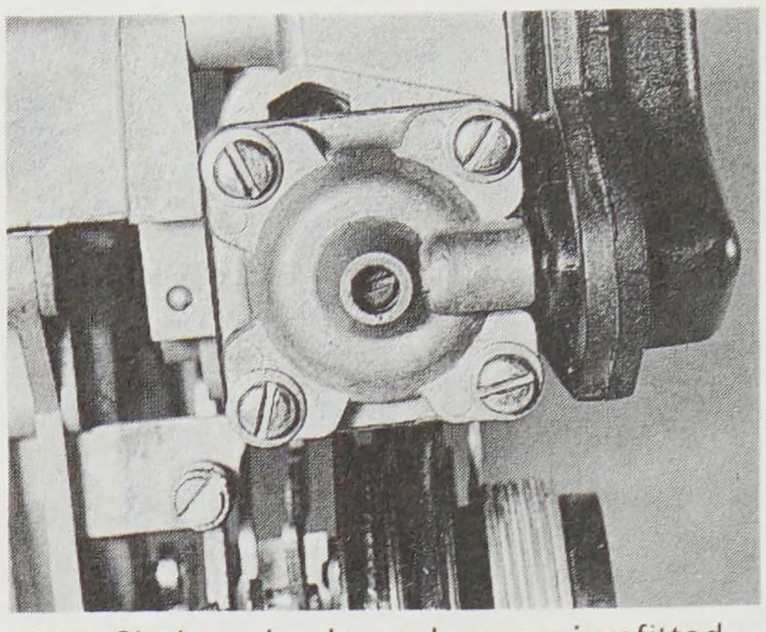
20.31B ... and lift out the thermostat



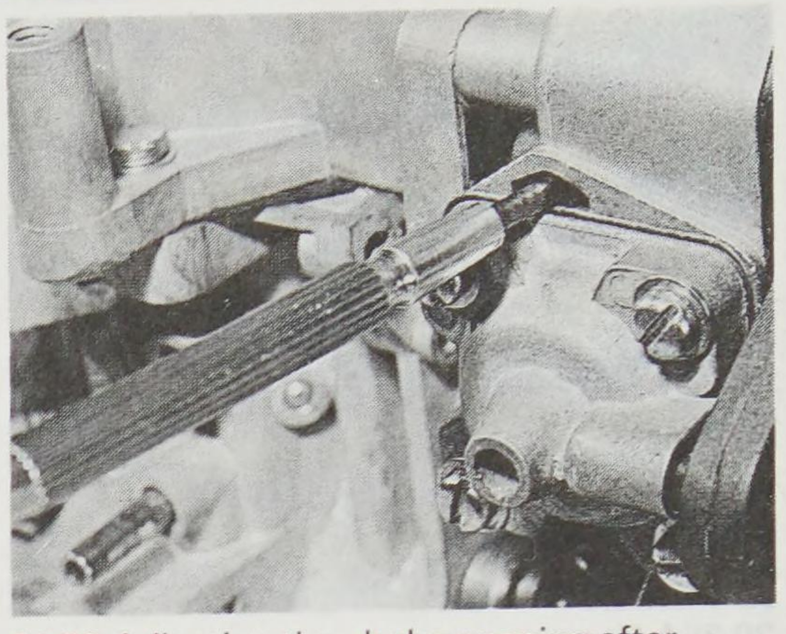
20.33 Fit the thermostat to the housing ...



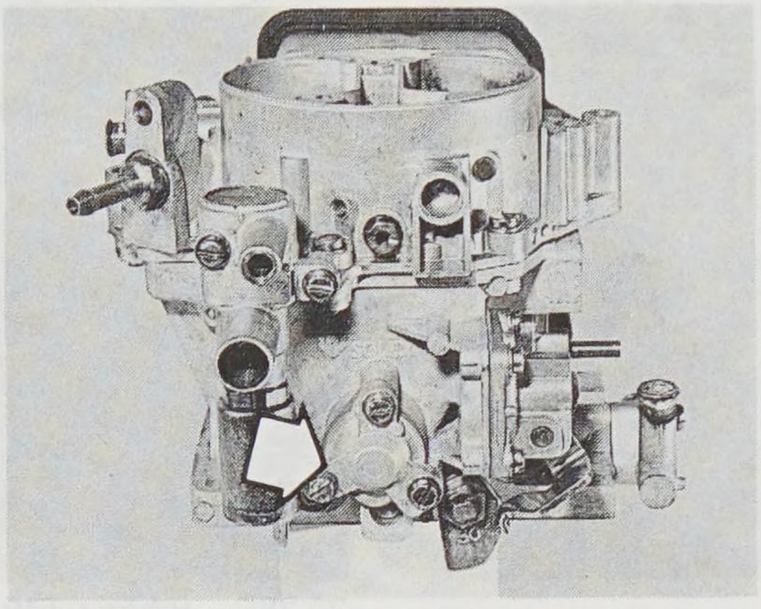
20.34 ... and the housing to the carburettor



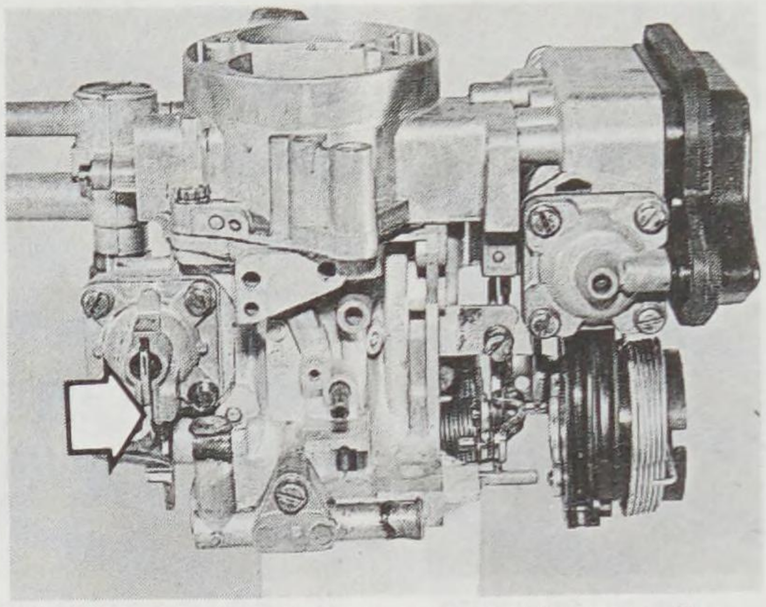
20.37 Choke unloader and reservoir refitted



20.38 Adjusting the choke opening after starting (COAS) screw



20.39A Enrichener device (arrowed) ...



20.39B ... and accelerator pump (arrowed)

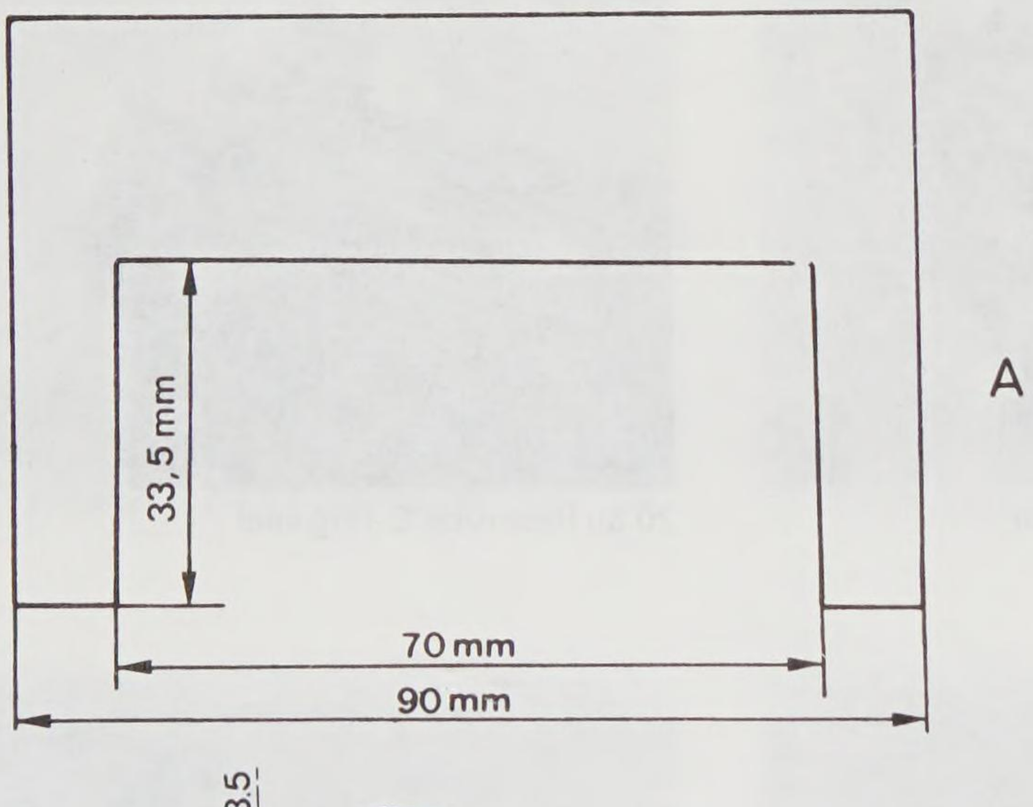


Fig 3.6 Float setting gauge (A) and automatic choke adjustment gauge (B). All dimensions in mm (Sec 20)

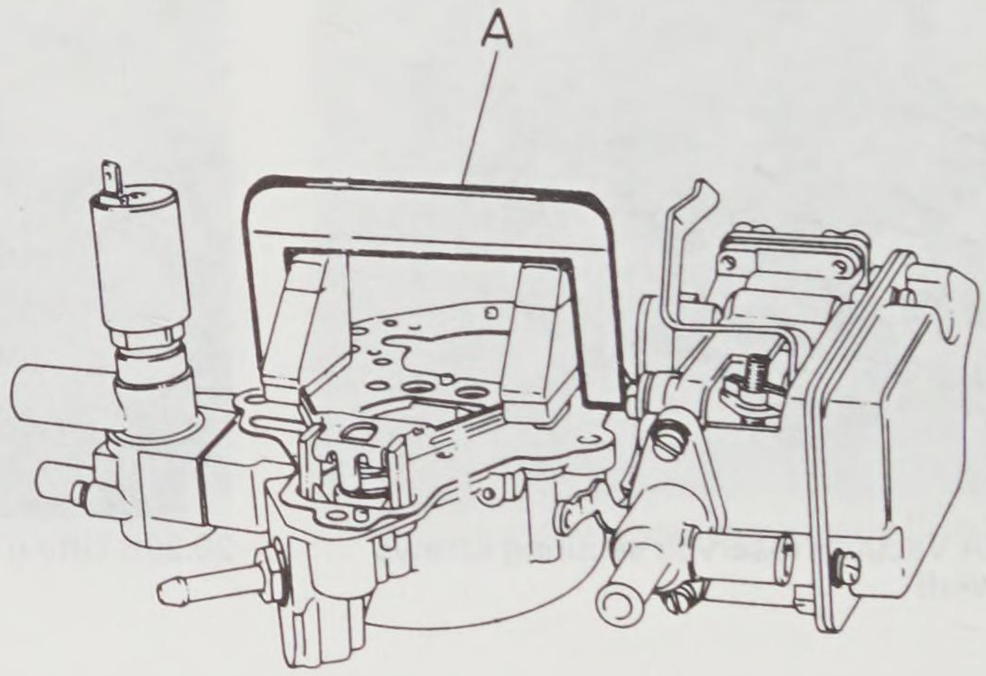


Fig 3.7 Checking float height using the special gauge (A) (Sec 20)

19 Check the O-ring seal is in good condition and refit the injector, pushing it down fully into the main body (photo).

20 Unscrew and remove the air correction jets. These can also be removed with the top cover in place (photo). The main jets are located under the air correction jets and can be retrieved using a long thin instrument, but be careful not to score the jets during this operation.

21 Clean the jets by blowing through them. Do not attempt to clean out the jets using wire. Refit the jets to their original bores on completion.

22 The primary and secondary venturis can be removed for cleaning if required (photo).

23 Unscrew and clean the idle jet from the side of the main body (photo).

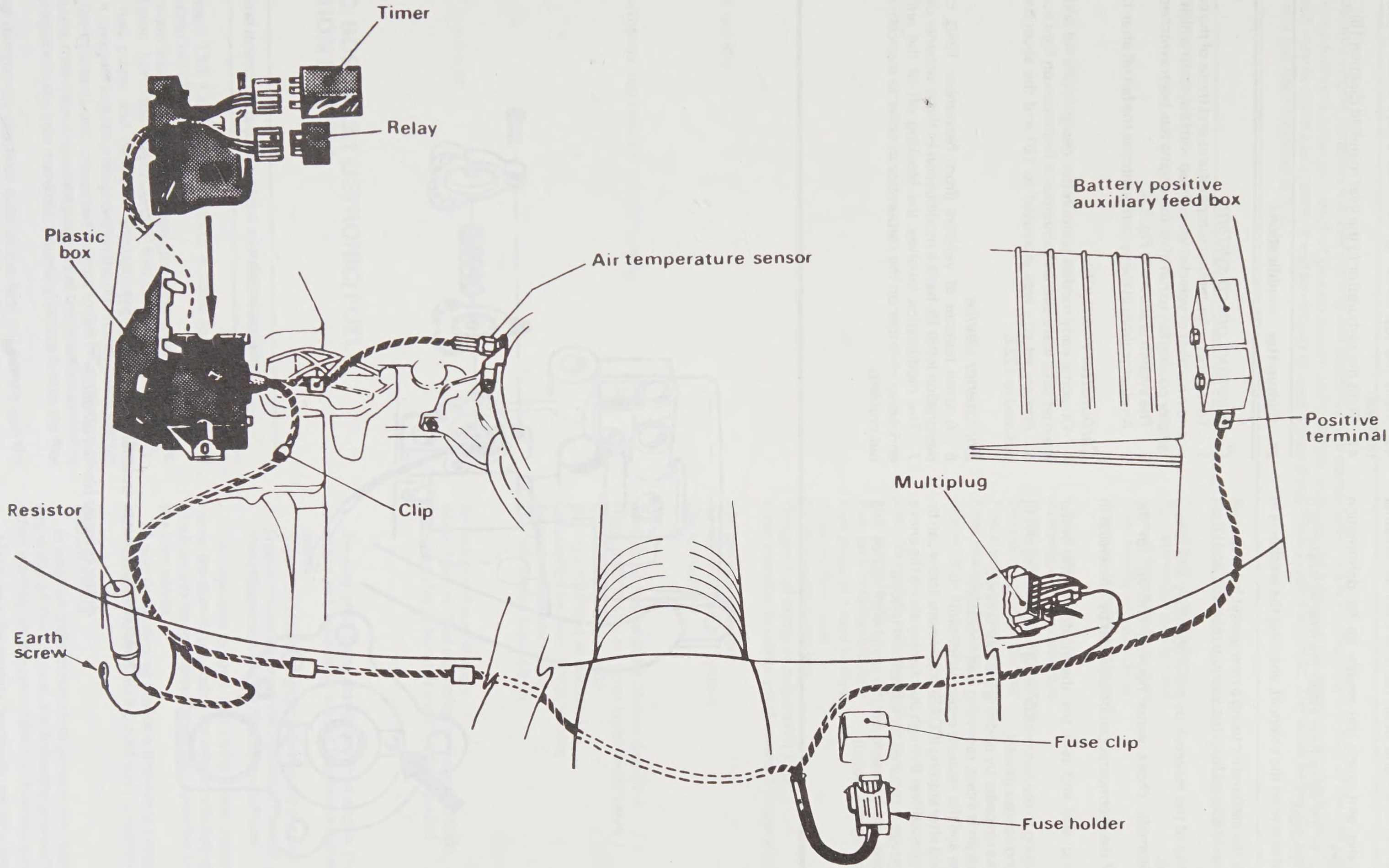


Fig 3.8 Carburettor cooling system layout (Sec 21)

24 Remove the retaining screw and lift off the float chamber breather solenoid valve.
25 Dismantle the valve and check the needle tip for deformation renewing it as necessary.
26 Fit a new washer to the valve then insert the needle, ensuring it locates in the washer (photos).
27 Fit the spring and screw on the solenoid, ensuring the washer is in place (photos).
28 Refit the valve to the carburettor using a new gasket (photo).
29 Remove the securing screws from the vacuum reservoir and lift off the reservoir (photos).
30 Check the integrity of the reservoir by blowing into it, and renew the O-ring seal (photo).
31 Remove the automatic choke water housing and lift out the thermostat (photos).
32 The operation of the thermostat can be checked by immersion in hot water.
33 Renew the O-ring seal and refit the thermostat to the water housing (photo).
34 Fit the water housing to the carburettor using a new gasket and fit and tighten the securing screws (photo).
35 Remove the choke unloader by undoing the four screws.
36 Check the diaphragm is intact, renewing it as necessary.
37 Refit the unloader and the vacuum reservoir (photo).
38 The choke opening after starting (COAS) adjustment screw can be reached using a small screwdriver through the channel above the choke unloader, but special gauge is required for adjustment (photo).
39 Similar inspections can be made on the enrichener device and accelerator pump diaphragms (photos).
40 Refit the top cover to the main body, which is a reversal of removal.
41 Refit the carburettor to the inlet manifold (Section 19).

21 Carburettor – modifications

Carburettor cooling system

1 To reduce under-bonnet temperatures and those of the carburettor, a certain number of vehicles were fitted with a system which allows the radiator cooling fan to run after the engine has been switched off.
2 The system is shown in Fig. 3.8.
3 An electric timer in the system switches the fan off after 12 minutes.

Carburettor main jets

4 On some early models (carburettor designations A9 and A10), the main jet sizes were altered to overcome hesitation on light acceleration.
5 Primary jet size was increased to 120 and the secondary jet size reduced to 122.5.

Enrichener device

6 A small number of vehicles (from November 1988, carburettor designation letter D), have a modification to the enrichener device.
7 The modification involves the blocking off of the orifice in the enrichener chamber on the carburettor in order to overcome a cutting out problem.

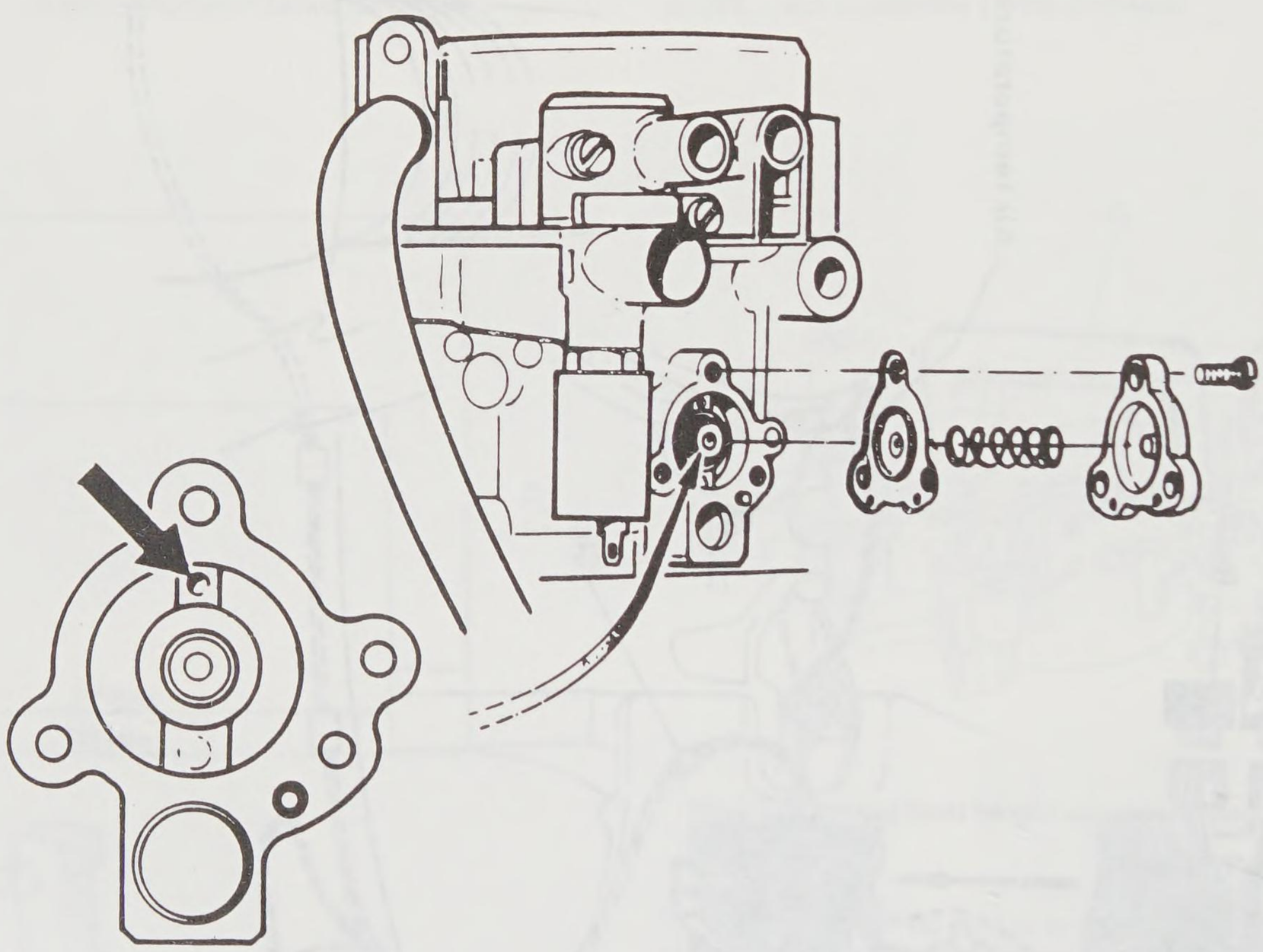


Fig 3.9 Modification to enrichener device (Sec 21)

Arrow indicates blanked off orifice

22 Fault diagnosis – carburettor models

Unsatisfactory engine performance, bad starting and excessive fuel consumption are not necessarily the fault of the fuel system or carburettor. In fact they more commonly occur as a result of ignition system faults. Before acting on the following it is necessary to check the ignition system first. Even though a fault may lie in the fuel system, it will be difficult to trace unless the ignition system is correct. The faults below therefore assume that, where applicable, this has been attended to first.

Symptom	Reason(s)
Difficult starting when cold	Automatic choke defective Fuel starvation (see below) Air leak in induction system Float needle valve sticking Poor compression (Chapter 1)
Difficult starting when hot	Choke linkage sticking Automatic choke defective Pedal pumped before starting Dirty or clogged air cleaner Fuel starvation (see below) Float chamber flooding Idle settings incorrect
Fuel starvation	Leak on suction side of pump Fuel pump faulty Fuel tank breather blocked Fuel pipes or hoses kinked Incorrect float level Blocked carburettor jets Clogged fuel pump or carburettor filter Float chamber breather valve solenoid inoperative
Engine will not idle	Idle settings incorrect Air leak in induction system Idle jet blocked
Poor performance, hesitation or erratic running	Air cleaner temperature control defective Faulty accelerator pump or enrichment valve Blocked carburettor jet(s) Wrong jet(s) fitted at overhaul Carburettor vacuum unit(s) leaking Air leak on induction side Fuel starvation (see above)
Backfiring in exhaust	Air leak in exhaust system Weak mixture (fuel starvation or induction leak) Exhaust valve(s) burnt or incorrectly adjusted

PART C: BOSCH L3.1 (JETRONIC) FUEL INJECTION SYSTEM

23 General description, precautions and depressurising

The Bosch L3.1 fuel injection system is fitted to all fuel injection models except the Mi 16.

The system is of the intermittent type operating under low pressure. Fuel is drawn from the rear-mounted fuel tank by an externally-mounted fuel pump and delivered through an in-line filter to the injectors. A pressure regulator mounted on the outlet side of the fuel rail (and thus the injectors), and connected by pipe to the inlet manifold to sense vacuum, maintains a constant pressure at the injectors according to the depression in the inlet manifold, returning excess fuel to the fuel tank.

A pulse damper on the inlet side of the fuel rail damps out the pressure pulses caused by the operation of the injectors.

An injection control unit and airflow meter mounted on the air filter housing analyses the following inputs:

Amount of air being drawn in by the engine via the airflow meter
Intake air temperature via the thermistor mounted in the airflow meter
Engine speed and angular position via the coil
Engine temperature via the injection (coolant) thermistor
Throttle position via the throttle switch unit

The injection control unit using these information sources determines the opening period of the injectors for any given engine condition. The injectors operate simultaneously, spraying fuel onto the inlet side of the inlet valves.

A supplementary air device is fitted to the system to compensate for the extra fuel required during cold start conditions.

Precautions

In addition to the precautions given in the 'Safety First!' *section at the beginning of this manual, the following precautions must be observed when working on any part of the fuel injection system*

1 Make sure the battery terminals are fully tightened before starting the engine.

2 Never disconnect the battery while the engine is running.

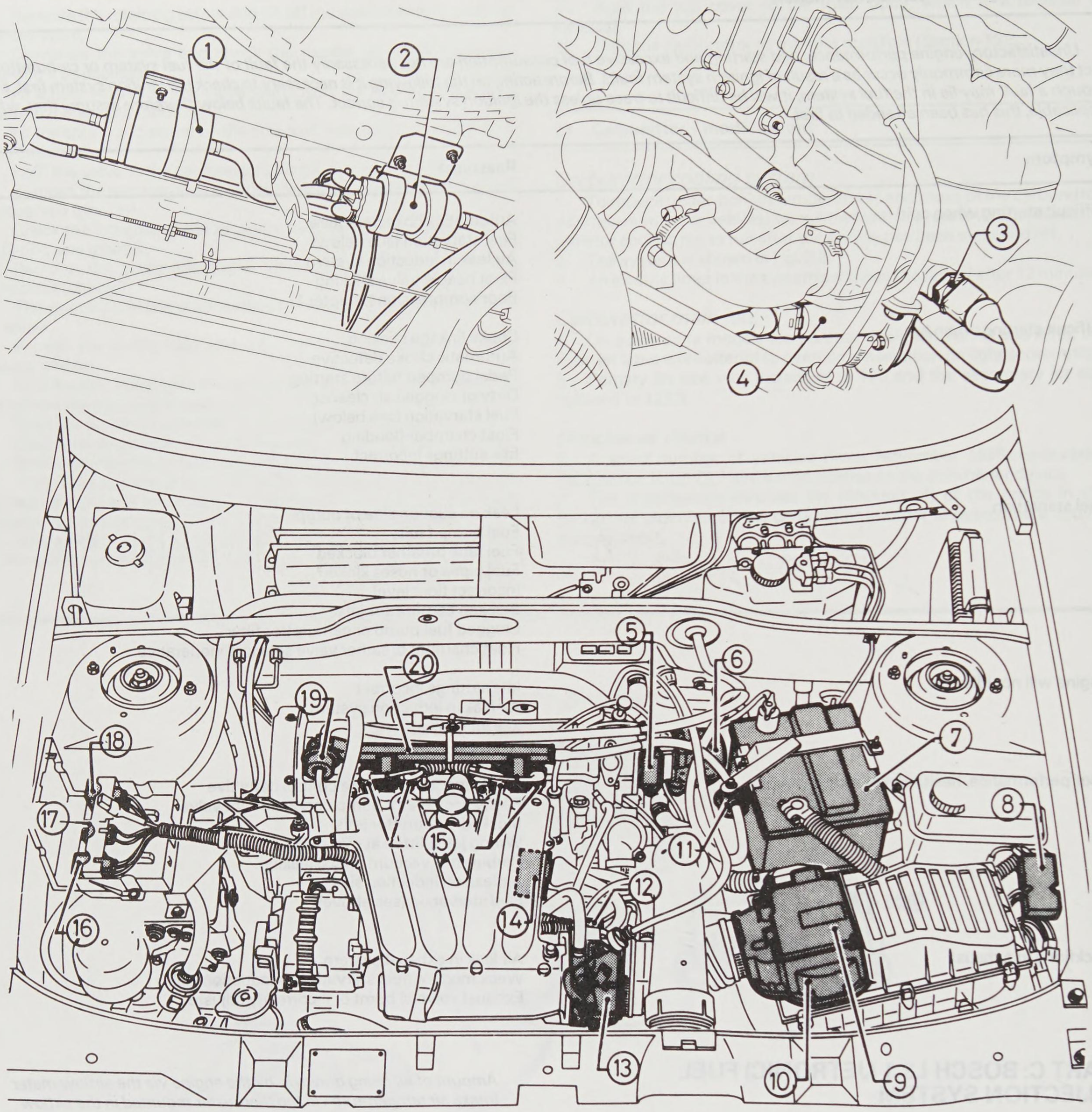


Fig 3.10 Fuel injection system component location (Bosch L3.1) (Sec 23)

1 Fuel filter
2 Fuel pump
3 Injection thermistor
4 Supplementary air device
5 Ignition amplifier module
6 Distributor
7 Battery
8 Battery plus unit
9 Injection unit
10 Airflow meter
11 Fuel pump damper
12 Throttle switch unit
13 Throttle housing
14 Ignition coil
15 Injectors (4)
16 Pump control relay
17 Fuel pump fuse
18 Injection supply relay
19 Fuel pressure regulator
20 Fuel rail

3 Always disconnect the battery before connecting a battery charger.
4 Never use a voltage source in excess of 12 volts to start the engine.
5 Never disconnect the electronic control unit while the ignition is switched on.
6 Before remaking any electrical connection, check the condition of the connecting pins for security, damage and corrosion. Check that the rubber seals in the connectors are effective and that the locking springs are fitted.
7 Disconnect the electronic control unit before carrying out any electric welding on the vehicle.
8 If the vehicle is likely to be subjected to temperatures in excess of 80°C (176°F), remove the electronic control unit.
9 Before carrying out an engine compression check, disconnect the electrical plugs to the injectors, thereby cutting off fuel supply.
10 Do not use a test lamp to check continuity of electrical circuits.
11 Do not attempt to produce a spark to prove electrical continuity.
12 When carrying out electrical tests on connectors, do not insert the test instrument probes into the connector. The rubber protector on the rear of the connector must be pulled back and the probes inserted on the input side of the connector pins.

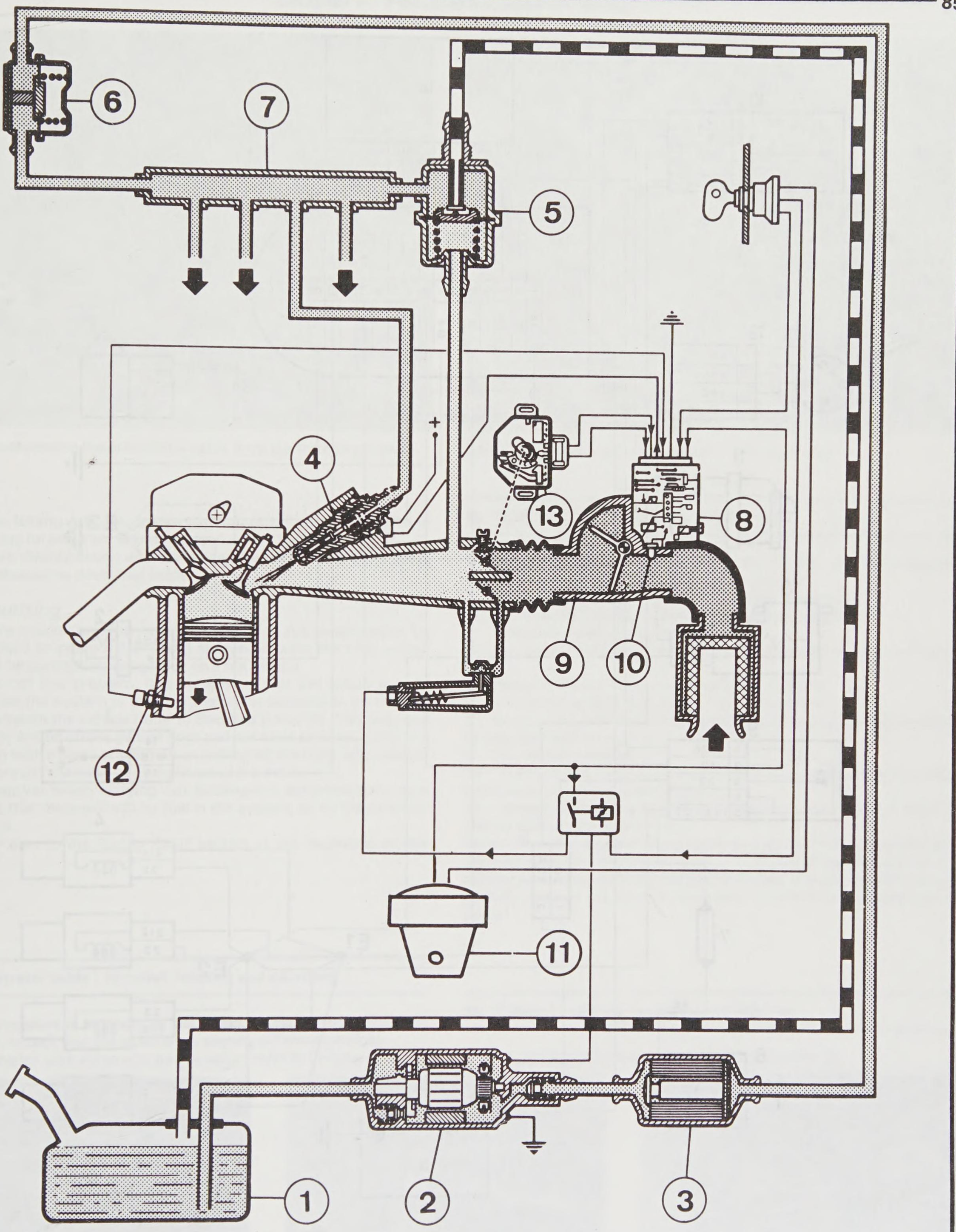


Fig 3.11 Fuel injection system schematic diagram (Bosch L3.1) (Sec 23)

1 Fuel tank
2 Fuel pump
3 Fuel filter (main)
4 Injectors (4)
5 Fuel pressure regulator
6 Fuel pump damper
7 Fuel rail
8 Injection unit
9 Airflow meter
10 Intake air temperature thermistor
11 Ignition coil
12 Injection thermistor

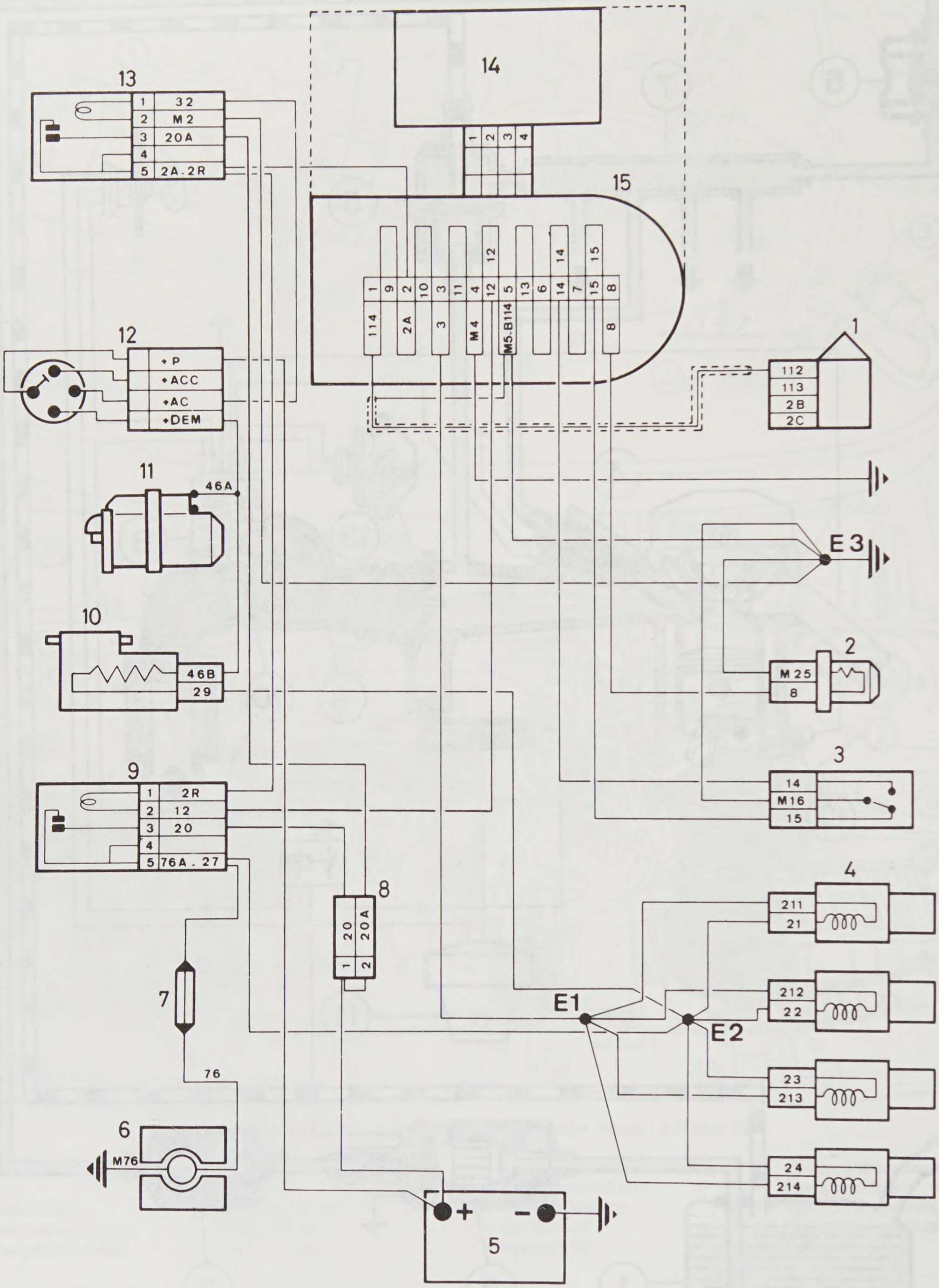
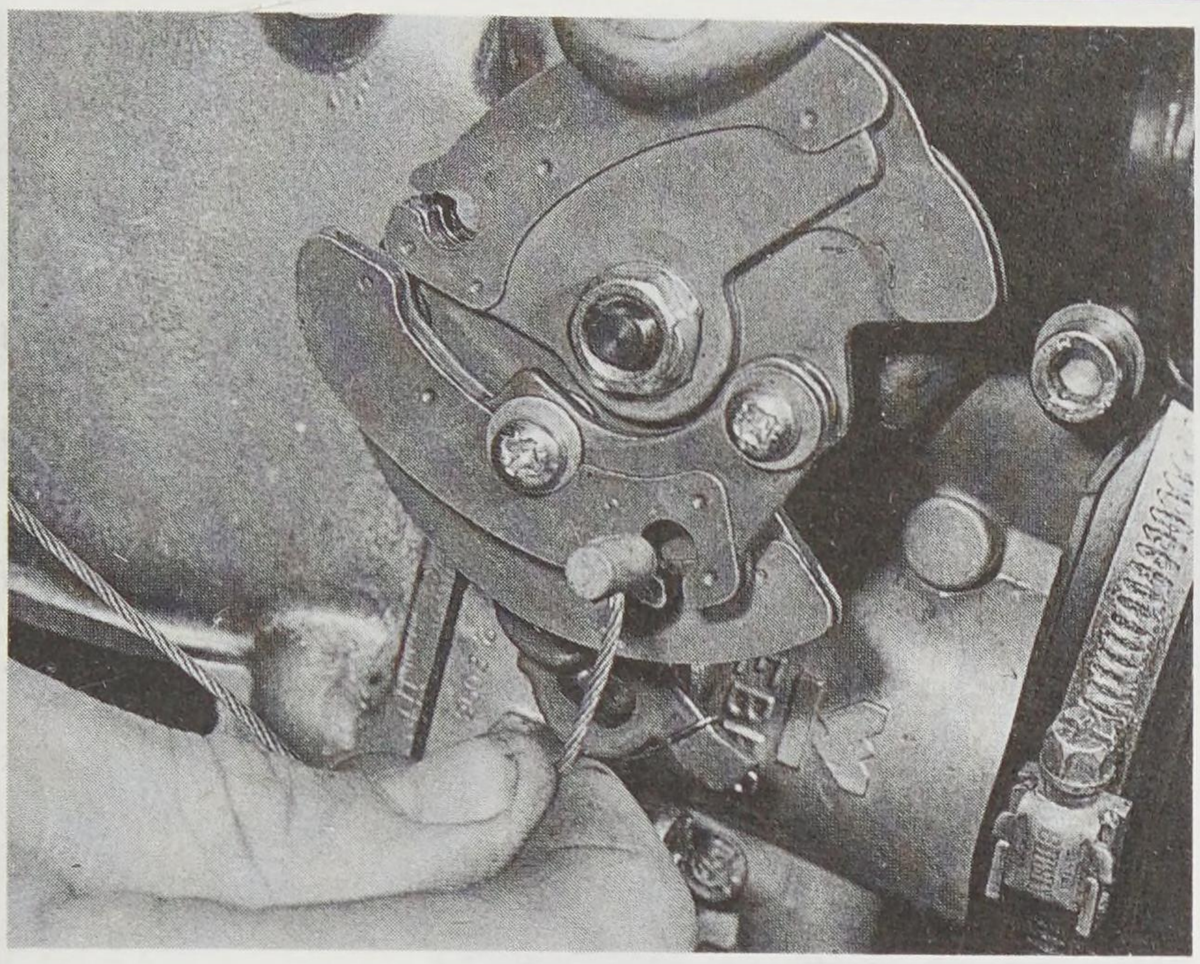
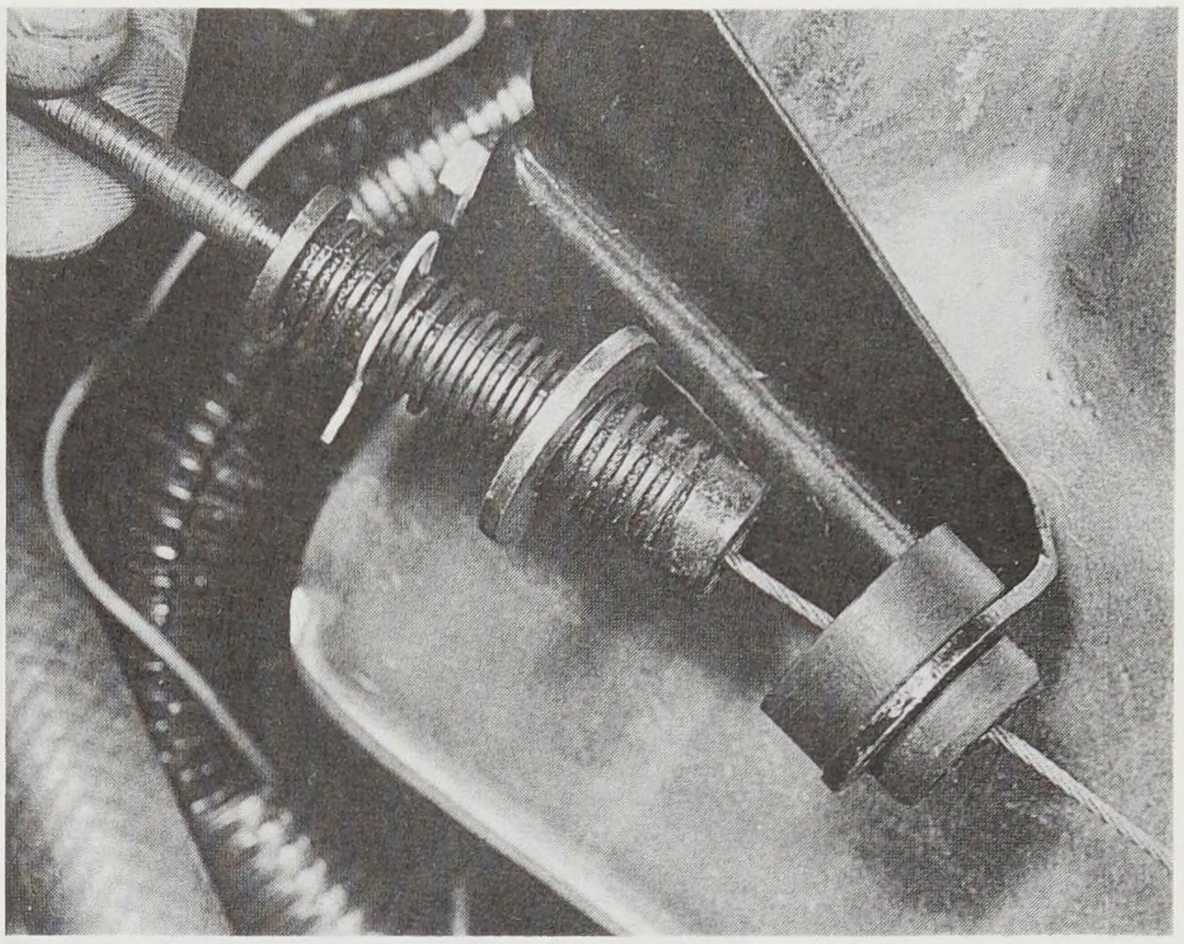


Fig 3.12 Wiring diagram Bosch L3.1 fuel injection system (Sec 23)

1 *Ignition coil*
2 *Injection thermistor*
3 *Throttle switch unit*
4 *Injectors (4)*
5 *Battery*
6 *Fuel pump*
7 *Fuel pump fuse (10 amp)*
8 *Battery positive unit*
9 *Pump relay*
10 *Supplementary air device*
11 *Starter motor*
12 *Ignition switch*
13 *Injection relay*
14 *Airflow meter*
15 *Injection unit*



24.1A Disconnecting the accelerator cable from the throttle quadrant



24.1B Disconnecting the accelerator cable end fitting

13 When testing voltages, ensure that the battery is fully charged and when testing for earth continuity, disconnect the battery.
14 Before disconnecting any fuel hose, the pressure in the system must be released as described below.

Depressurising

15 Before making any fuel hose disconnection the system must be depressurised to prevent fuel being sprayed around the engine bay. This could be particularly dangerous on a hot engine.
16 To avoid this problem, it is suggested that the safest way to depressurise the system is to undo the outlet connection on the fuel filter underneath the vehicle (refer to Sections 8 and 38). This way any fuel spillage will be on the garage floor and not a hot exhaust. Cover the connection with a piece of cloth when pulling off the hose, and remember to reconnect the hose on completion of the work.
17 Remember when carrying out subsequent disconnections over the engine that there will still be fuel in the system, so be prepared for any spillage.
18 Refer also to the *'Safety First!'* section at the beginning of this manual.

24 Accelerator cable – removal, refitting and adjusting

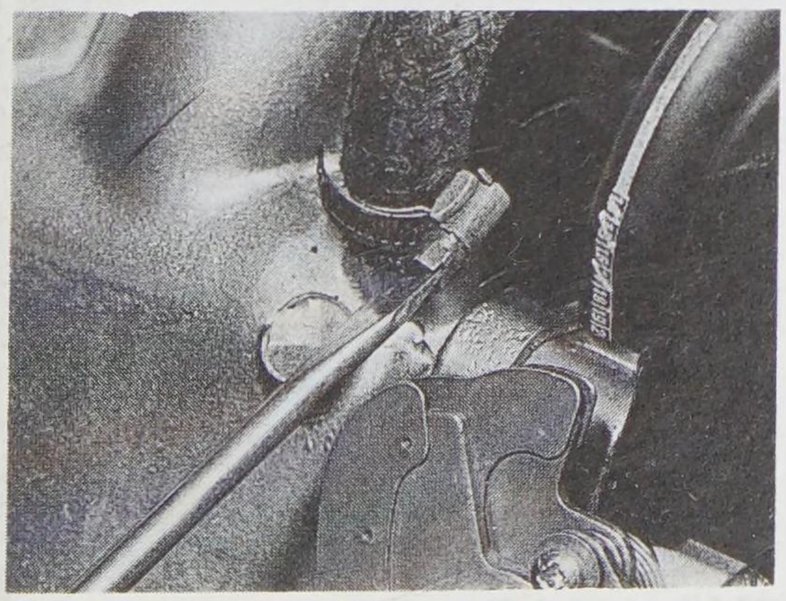
1 The procedure is basically as described for carburettor models in Section 11, except that the quadrant is slightly different (photos).
2 For vehicles with automatic transmission, refer to Chapter 6.

25 Inlet manifold – removal and refitting

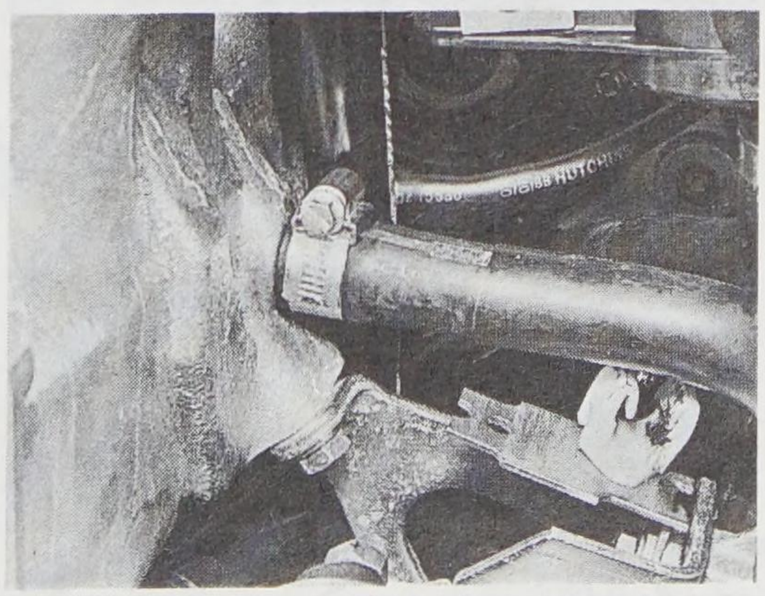
1 Remove the fuel rail as described in Section 33 – there is no need to disconnect any fuel hoses. Lay the rail to one side.
2 Disconnect the brake servo vacuum hose (photo).
3 Remove the throttle housing as described in Section 31.
4 Disconnect and unbolt the coil.
5 Disconnect the supplementary air device air hose from the manifold (photo).
6 Remove the bolt from the starter bracket (photo).
7 Unbolt the oil filler tube support bracket (photo).
8 Remove the manifold securing bolts and the two 5 mm Allen bolts (a long Allen key is required).
9 Lift off the manifold.
10 Refitting is a reversal of removal using a new gasket and jointing compound where necessary (photo).
11 Ensure the locating dowels are in position and tighten all bolts to their specified torque (photos).
Note: *The engine gasket kit contains gaskets for both carburettor and injection type manifolds. The injection type gasket has cut-outs for the injector ports. Ensure the correct gasket is fitted. The carburettor type will partially obstruct the injector ports causing erratic running and loss of power*

26 Exhaust manifold – removal and refitting

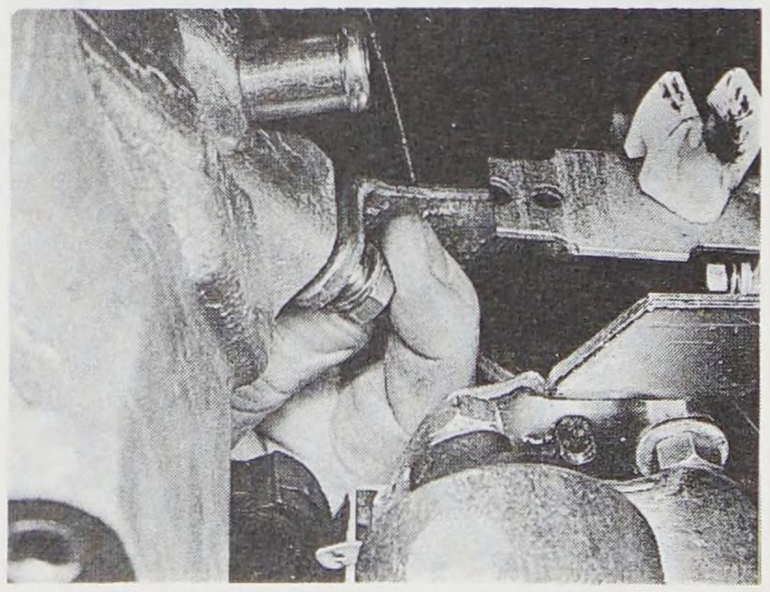
The procedure is as described in Part B, Section 13.



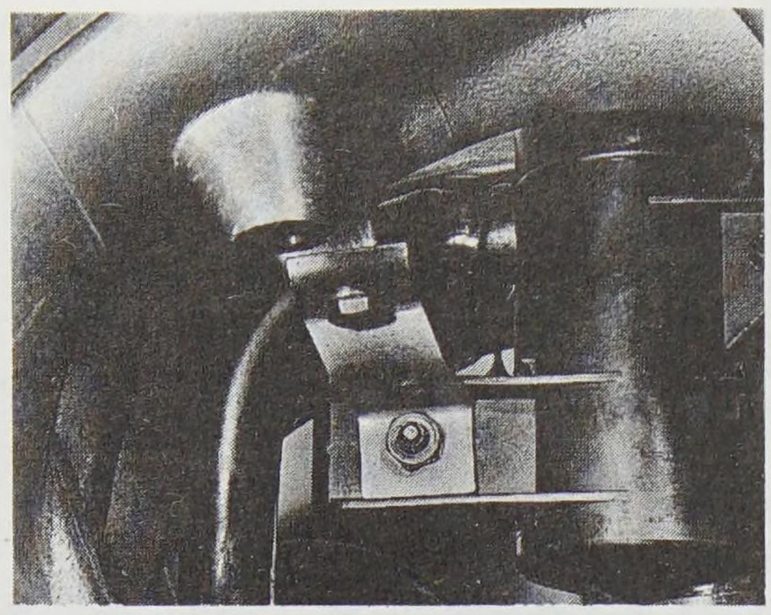
25.2 Disconnecting the brake servo vacuum hose



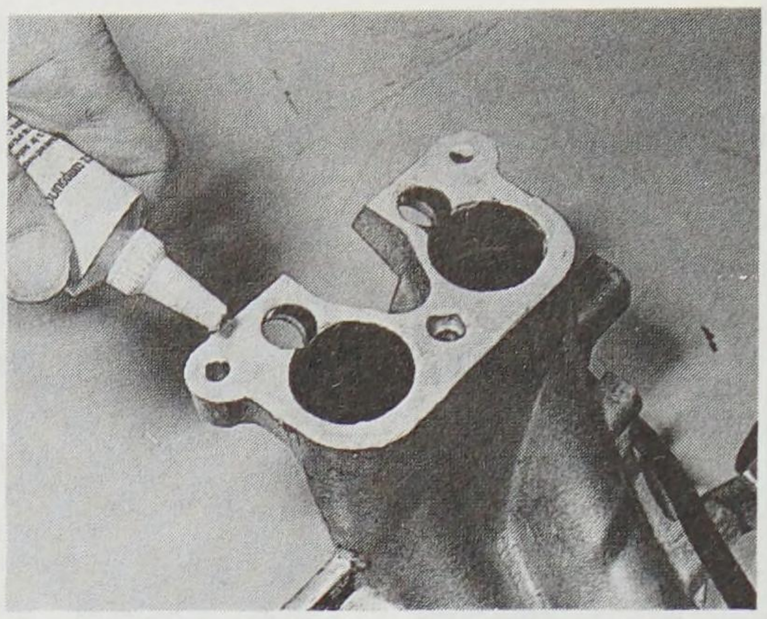
25.5 Supplementary air device air hose connection on inlet manifold



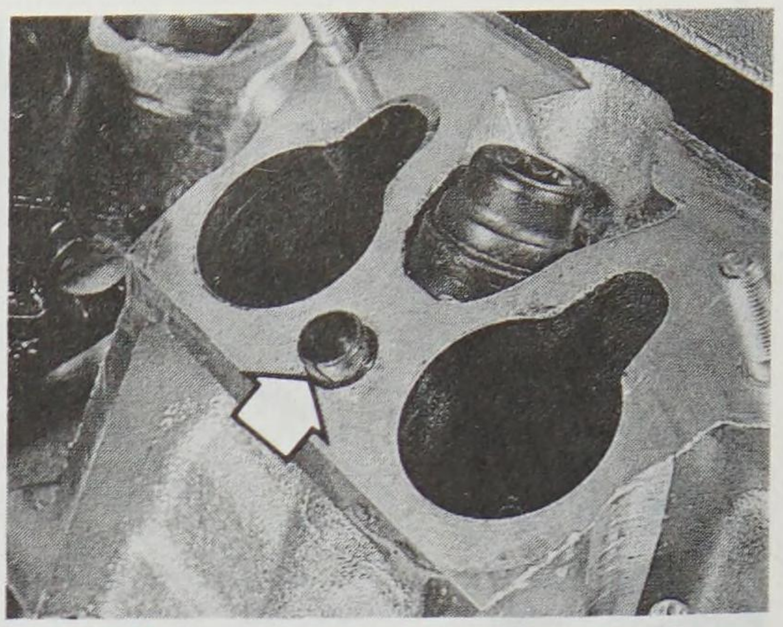
25.6 Removing the bolt from the starter bracket



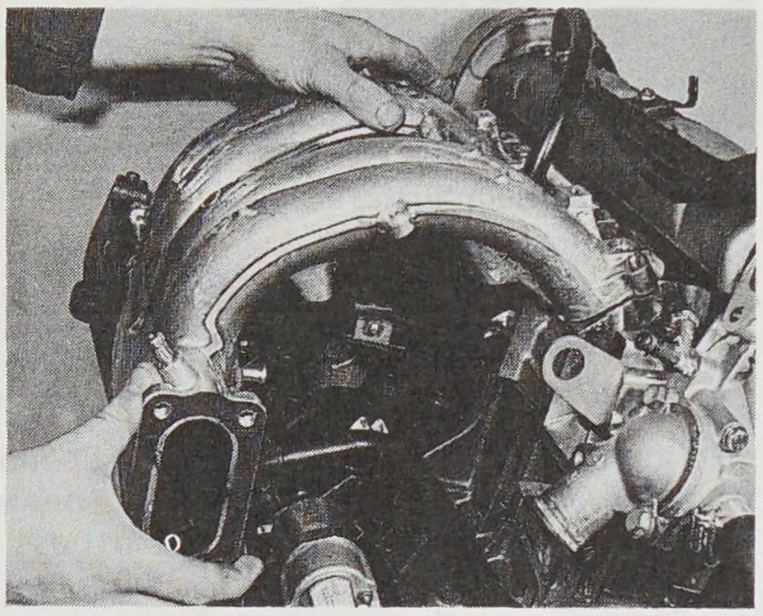
25.7 Oil filler tube support bracket



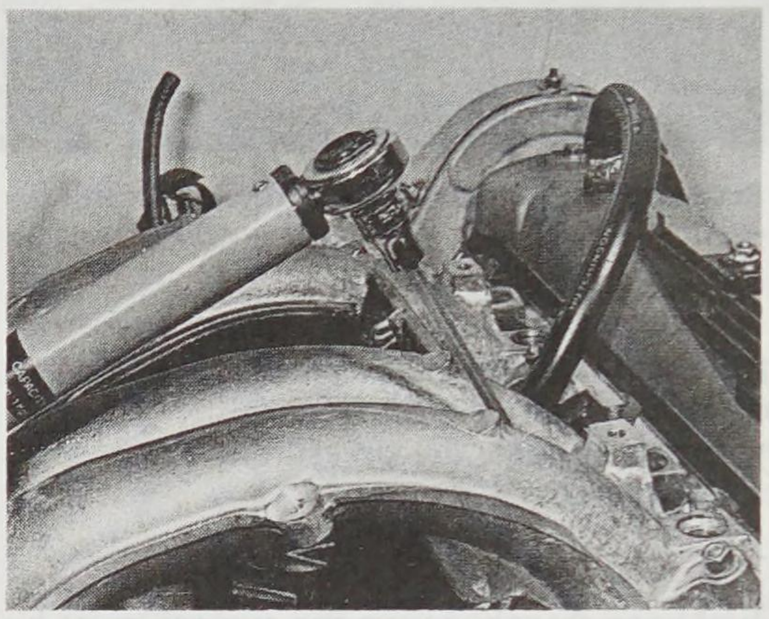
25.10 Applying jointing compound to the inlet manifold



25.11A Ensure locating dowels (arrowed) are in position



25.11B Fitting the inlet manifold



25.11C Tightening the manifold securing bolts

27 Air filter element and housing – removal and refitting

1 Disconnect the injection unit multi-plug (photo).
2 Loosen the clip on the upper air inlet duct.
3 Release the clips securing the top cover, remove the cover and lift out the air filter (photos).
4 To remove the complete air filter housing, release the lower clips, disconnect the lower duct and lift out the housing (photo).
5 Clean out the interior of the housing before fitting a new filter, which is a reversal of removal.

28 Idle speed and mixture – adjustment

1 Before attempting to adjust the idle speed or mixture (CO), ensure the following conditions are met:

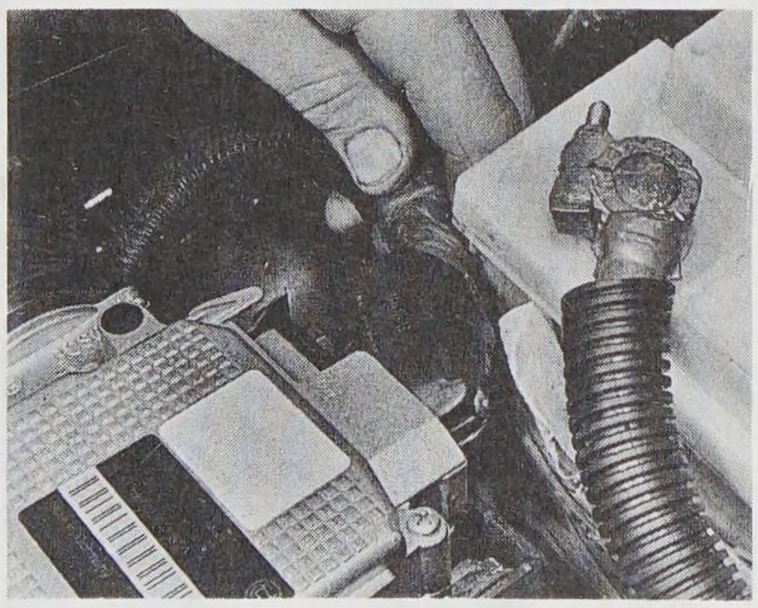
(a) Ignition system is in good condition and correctly adjusted
(b) Air filter is clean and fitted
(c) Throttle initial positions correctly adjusted
(d) Throttle switch unit correctly adjusted
(e) Engine must be hot, the cooling fan having cut in at least once, but the fan must not be running during the actual adjustment

Idle speed

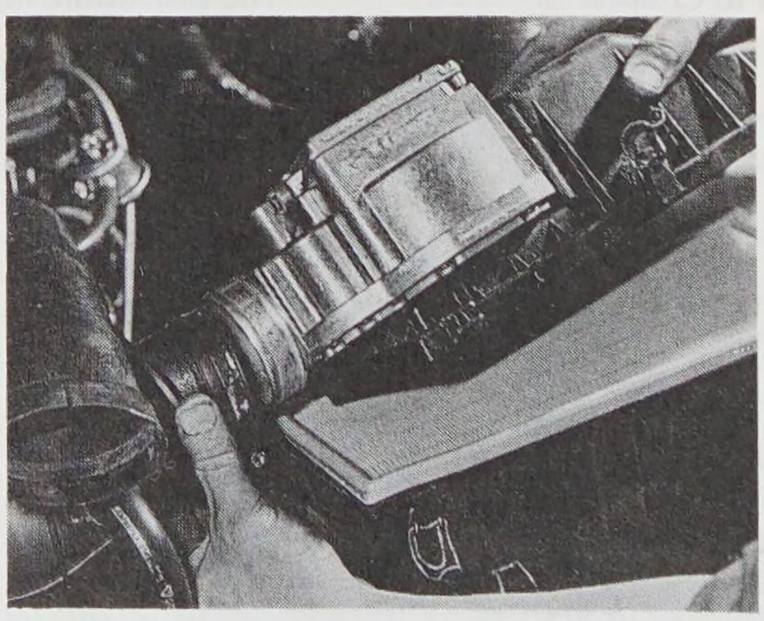
2 Idle speed is adjusted using the idle speed adjustment screw on the throttle housing. Adjust the screw clockwise to increase and anti-clockwise to decrease idle speed, to that specified.

Mixture (CO)

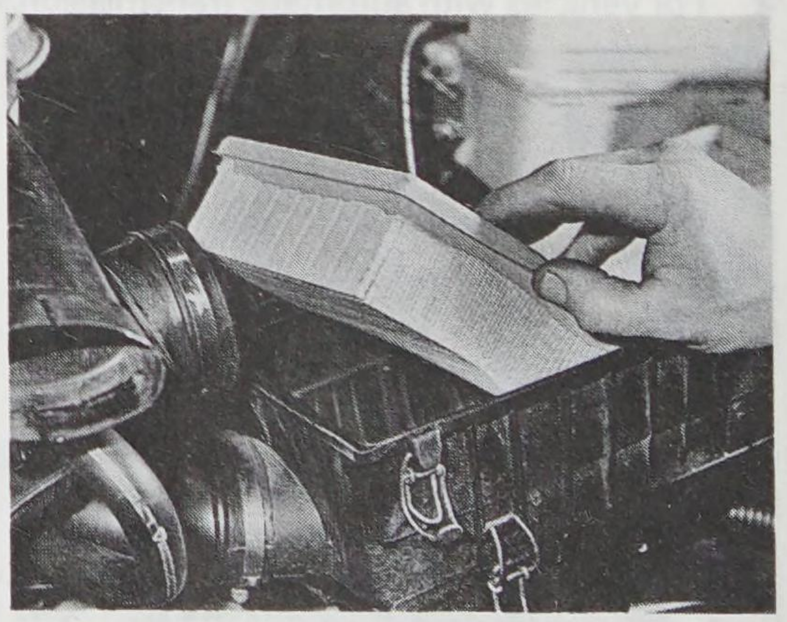
3 Before attempting any adjustment of the mixture, ensure that any exhaust emission control laws in force will not be violated.
4 Prise out the tamperproof cap covering the mixture (CO) adjustment screw on the injection unit.
5 Connect an exhaust gas analyser to the vehicle in accordance with the manufacturer's instructions.



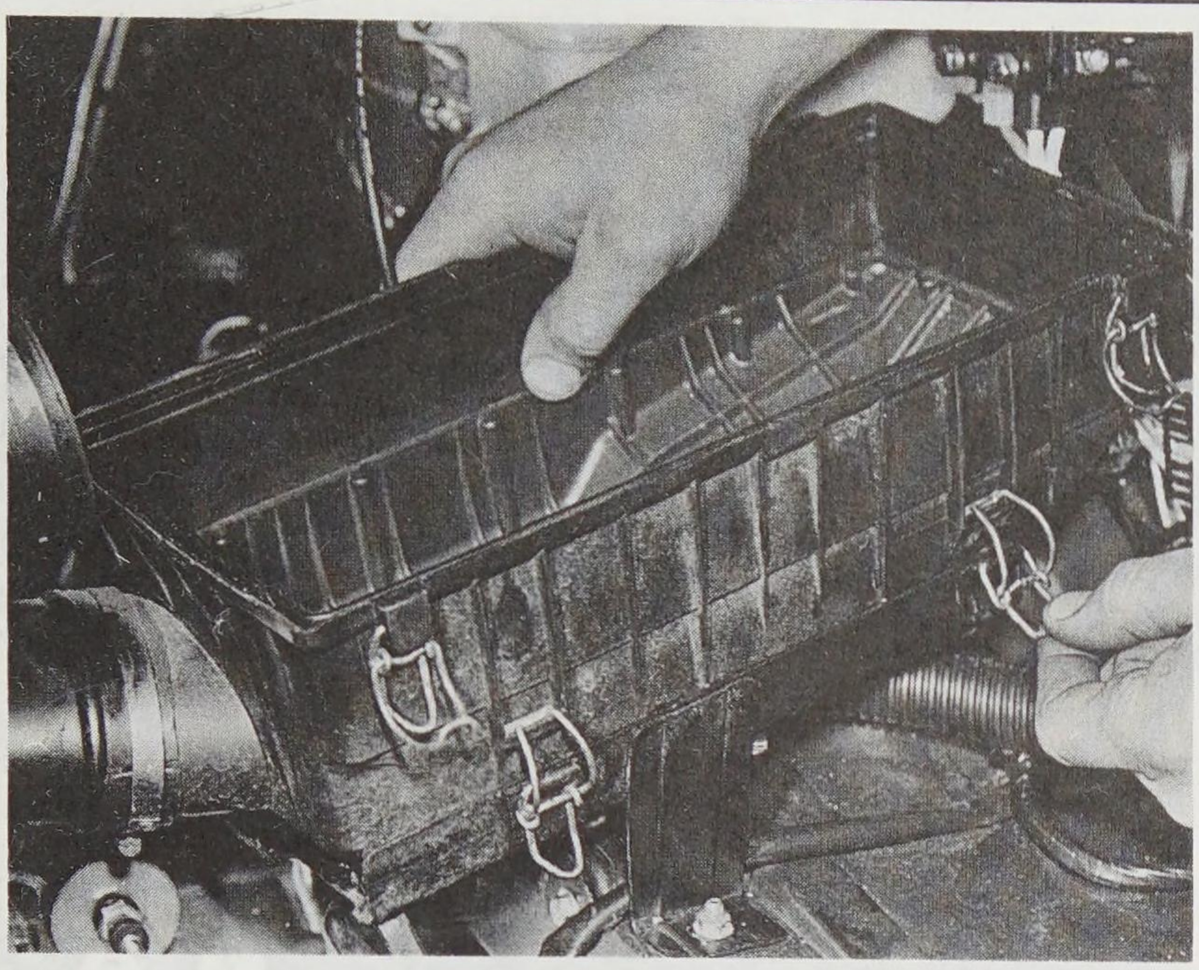
27.1 Disconnecting the injection unit multi-plug



27.3A Lifting off the top cover ...



27.3B ... and air filter element



27.4 Removing the air filter housing

6 Start the engine and allow it to idle. Turn the mixture (CO) adjustment screw in or out to obtain the specified CO content.
7 Re-adjust idle speed as described above.
8 On completion, stop the engine, remove all test equipment and fit a new tamperproof cap to the screw.

29 Throttle initial position – adjustment

1 Disconnect the accelerator cable (Section 24).
2 Disconnect the throttle switch unit (Section 30).
3 Loosen the throttle switch unit mounting bolts and turn the unit fully anti-clockwise, then tighten the mounting bolts.

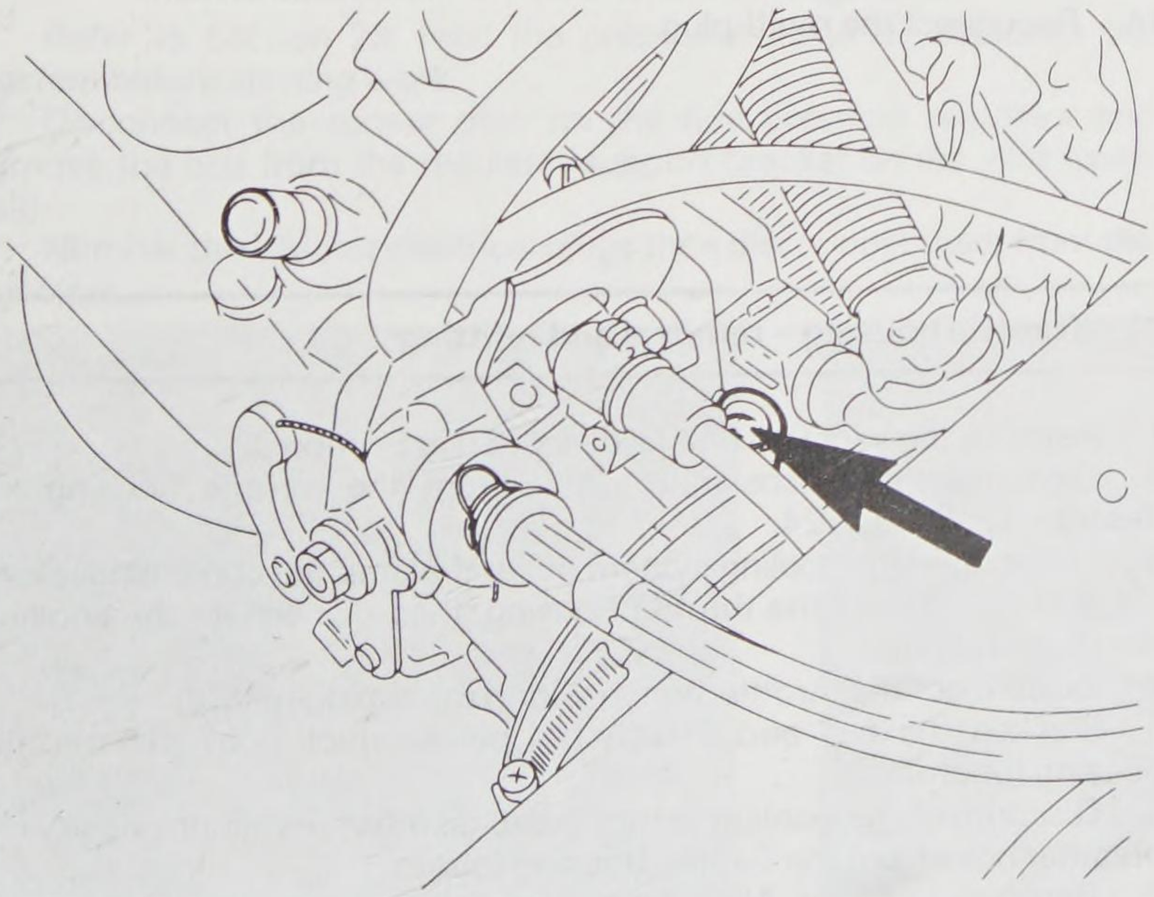
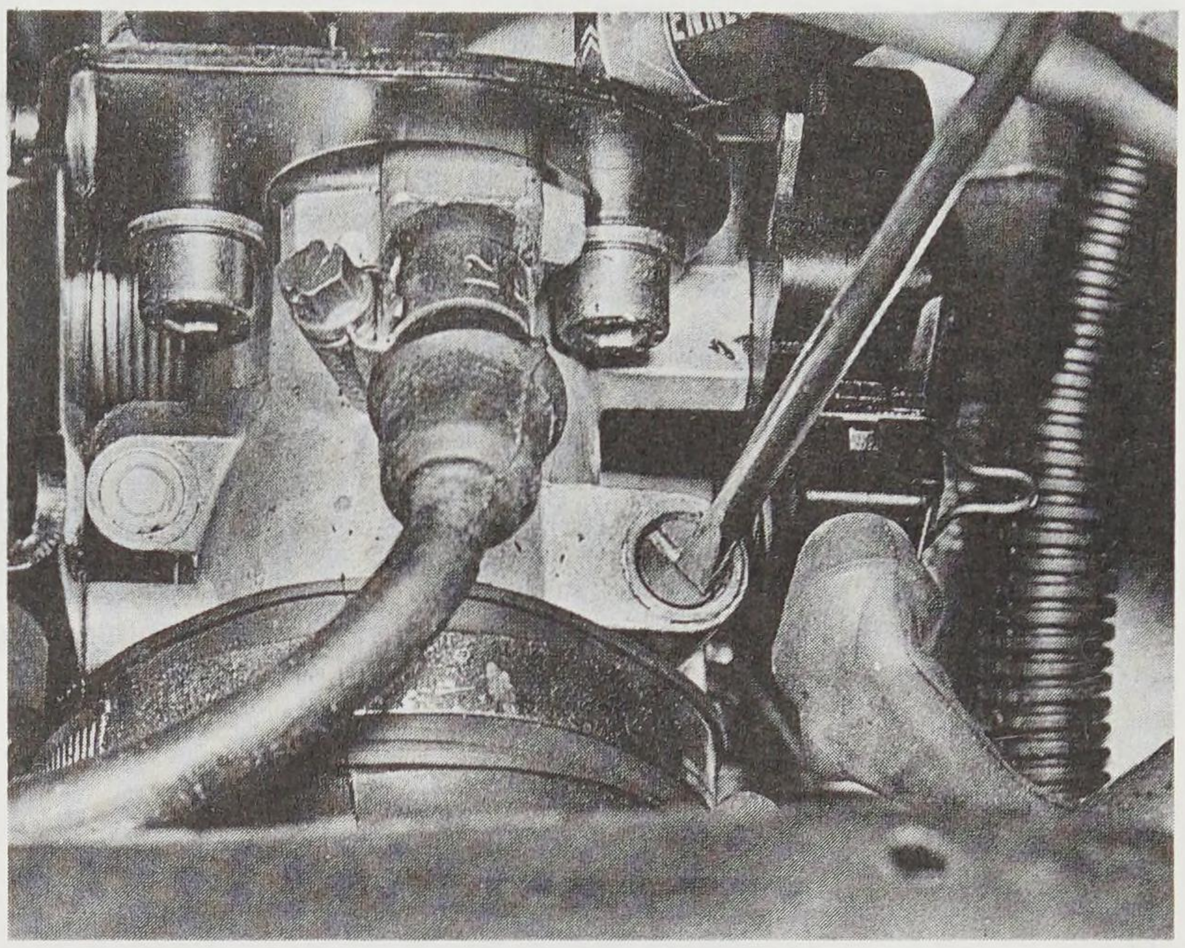


Fig 3.13 Idle speed adjustment screw (arrowed) on throttle housing – L3.1 (Sec 28)



28.2 Adjusting the idle speed screw on Bosch L3.1 injection system

Primary barrel

4 Prise out the tamperproof cap from the throttle stop screw and loosen the screw until it is clear of the throttle lever (photo).
5 Place a 0.05 mm (0.002 in) feeler gauge blade between the lever and the screw and tighten the screw until it just contacts the feeler gauge without trapping it. The throttle lever must not be moved.
6 Remove the feeler gauge then turn the screw in by a further quarter-turn. Fit a new tamperproof cap.

Secondary barrel

7 The procedure is as described for the primary barrel but using the secondary throttle adjustment screw (photos).
8 On completion of the adjustment, apply a drop of thread-locking compound to the head of the adjustment screw.
9 Adjust the throttle switch unit (Section 30).
10 Reconnect the throttle switch and accelerator cable.

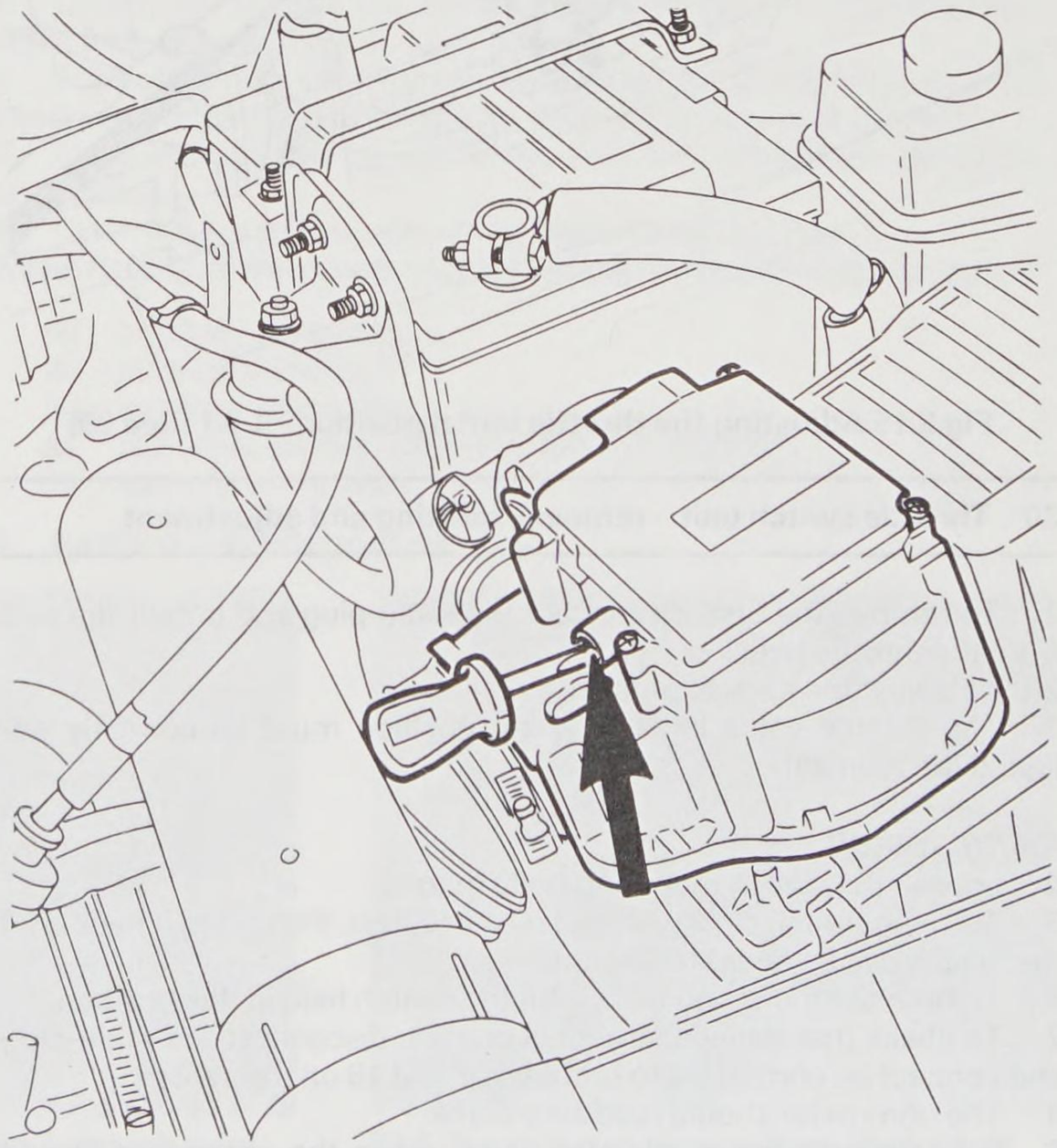
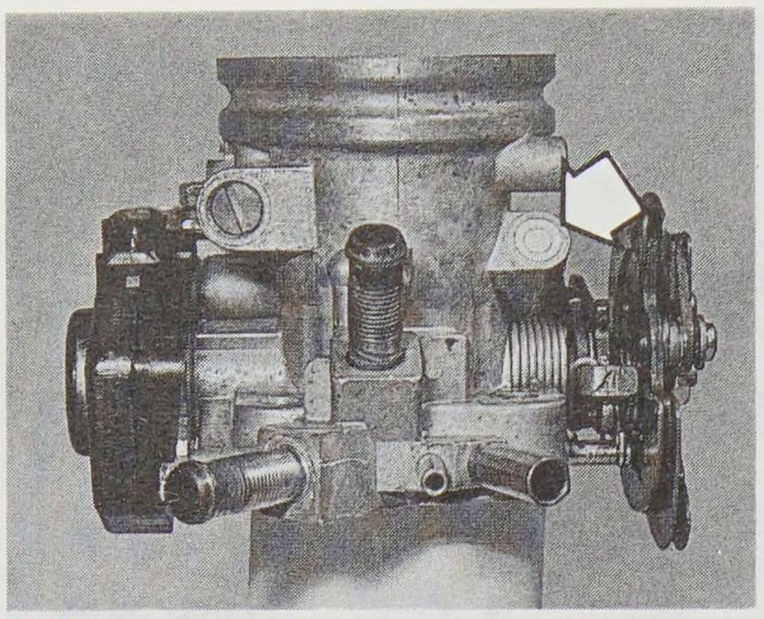
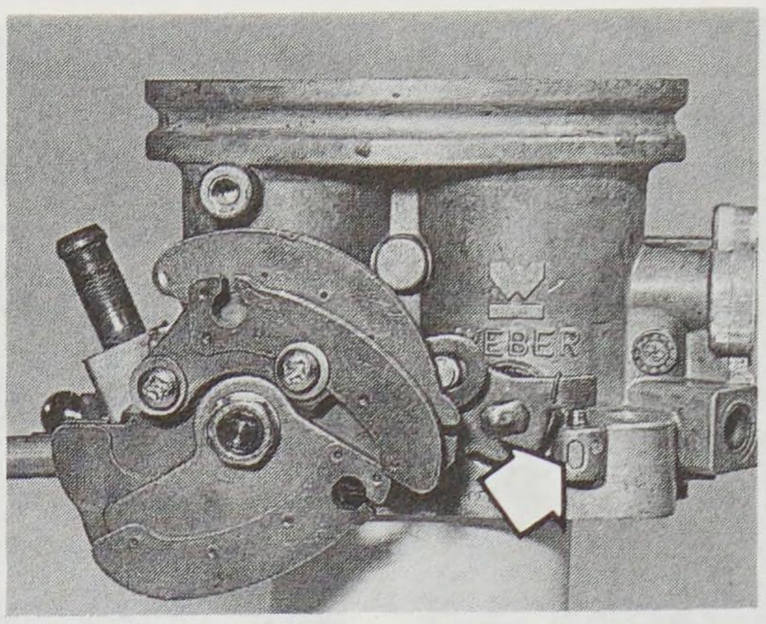


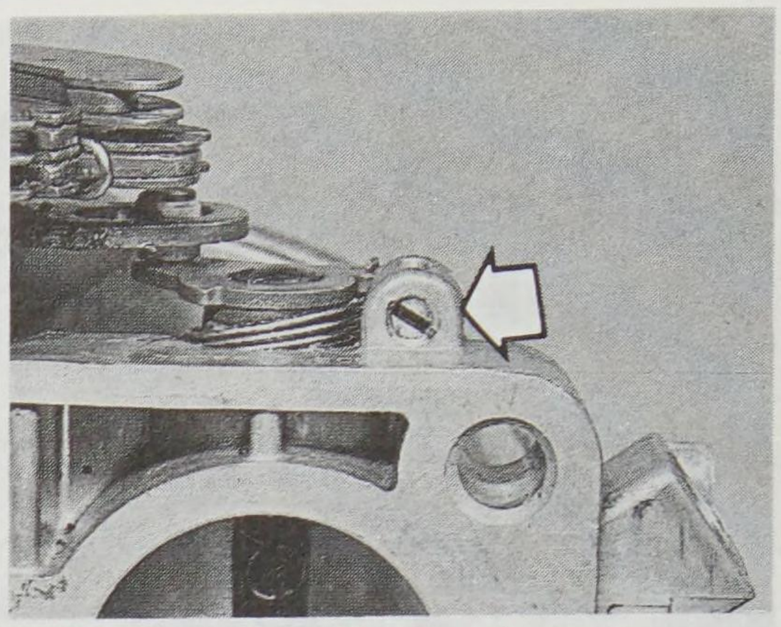
Fig 3.14 Mixture (CO) adjustment screw on injection control unit (arrowed) – L3.1 (Sec 28)



29.4 Tamperproof cap covering primary throttle stop screw (arrowed)



29.7A Secondary throttle adjusting screw (arrowed)



29.7B ... and viewed from underneath

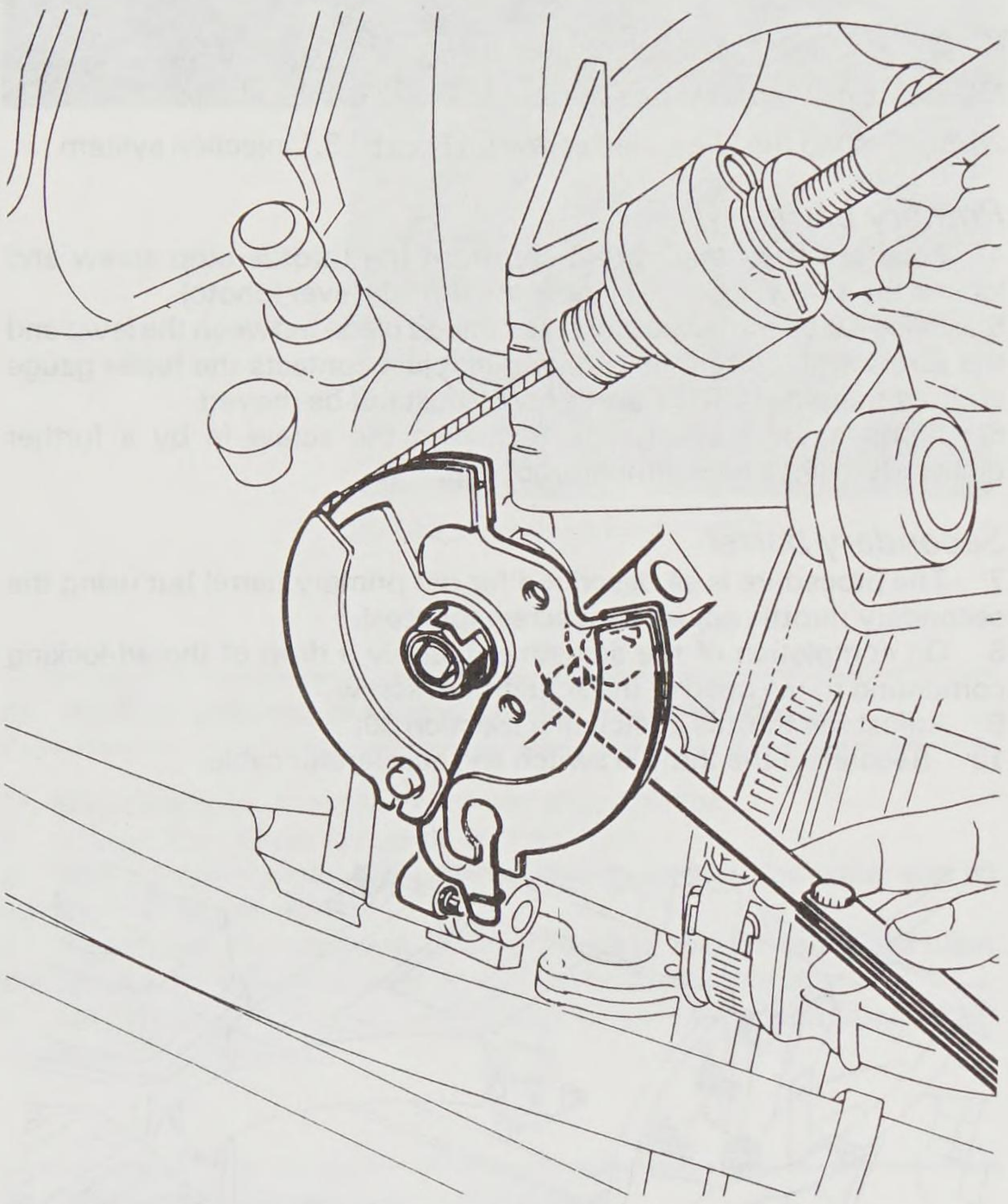


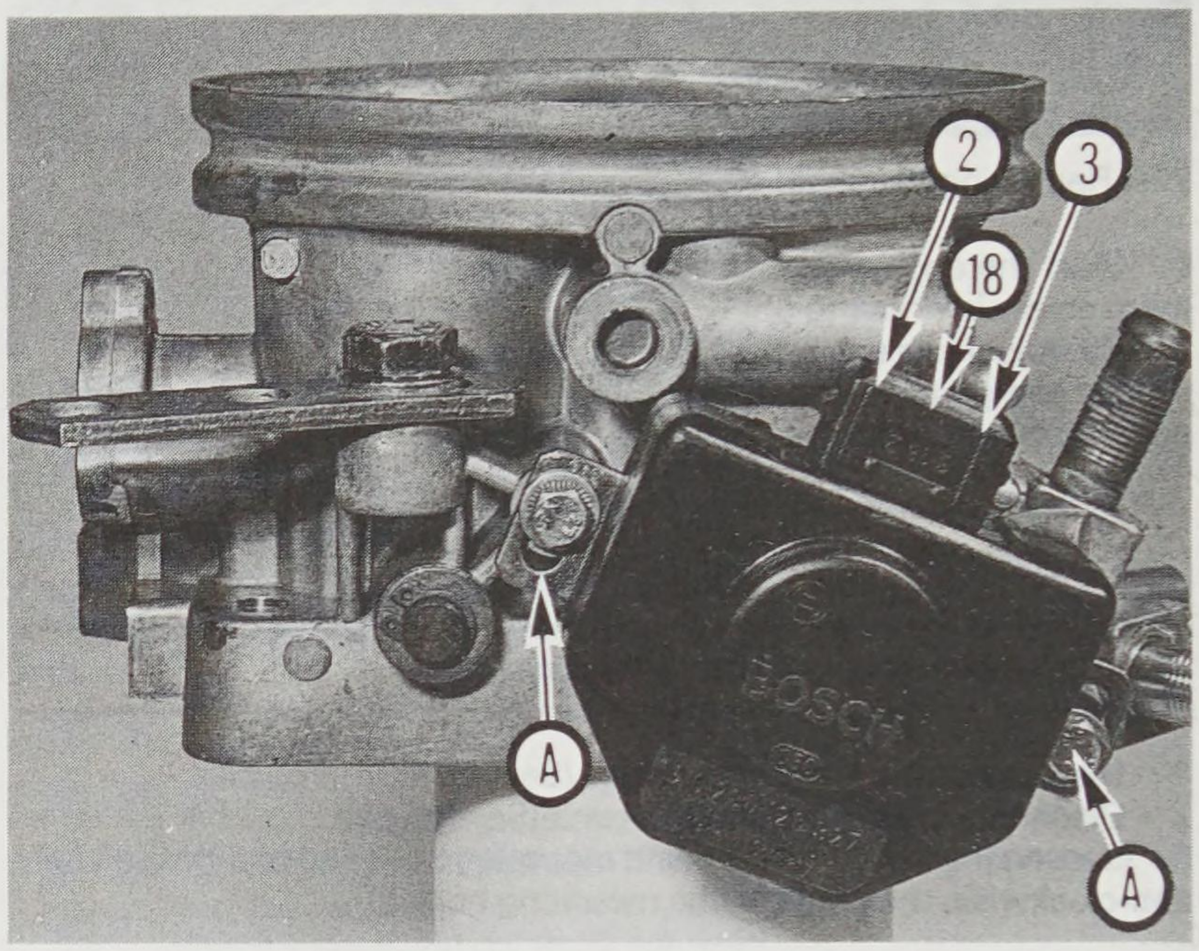
Fig 3.15 Adjusting the throttle initial position – L3.1 (Sec 29)

30 Throttle switch unit – removal, refitting and adjustment

1 To remove the unit, disconnect the multi-plug and unbolt the unit from the throttle housing.
2 To adjust the switch, proceed as follows.
3 The throttle valve initial opening position must be correctly adjusted (Section 29).

Idling switch

4 Loosen the switch mounting bolts (photo).
5 Turn the switch clockwise as far as it will go, then bring it back until the switch can be heard to operate.
6 Tighten the mounting bolts with the switch held in this position.
7 To check that the adjustment is correct, disconnect the multi-plug and connect an ohmmeter to terminals 2 and 18 on the switch.
8 The ohmmeter should read zero ohms.
9 Fully depress the accelerator pedal, when the ohmmeter should read infinity.
10 If these readings are incorrect, re-adjust the switch.



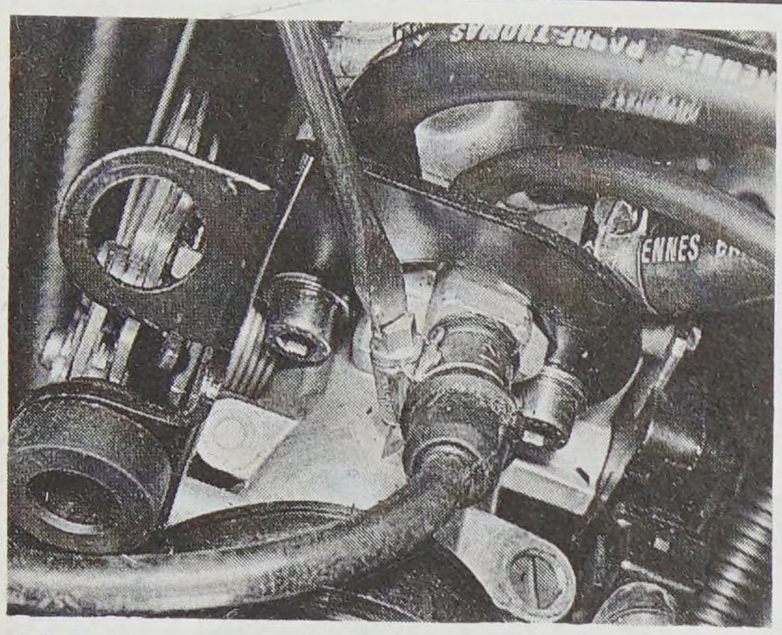
30.4 Throttle switch unit mounting bolts (A) and plug connections

Full load switch

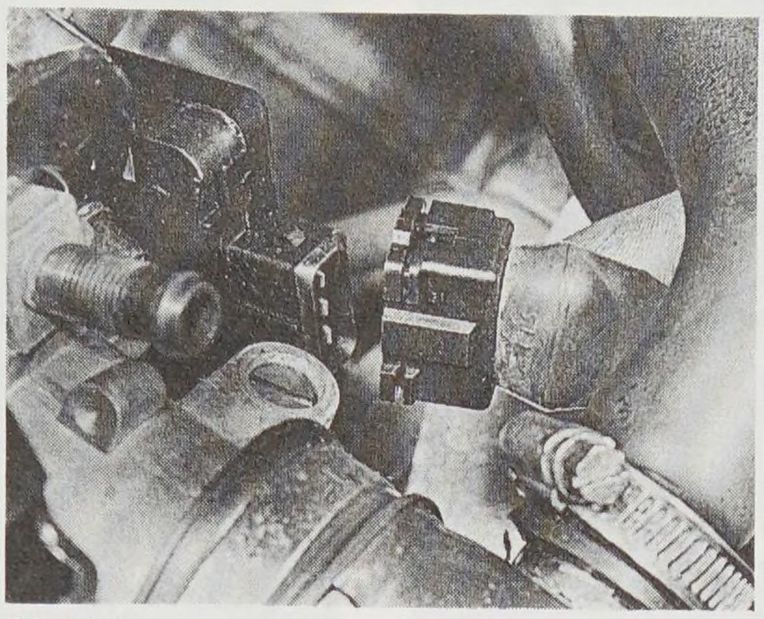
11 Connect the ohmmeter to terminals 3 and 18 on the switch. The reading should indicate infinity.
12 Fully depress the accelerator pedal, when the reading should be zero ohms.
13 If these readings are incorrect, renew the throttle switch.
14 Reconnect the multi-plug.

31 Throttle housing – removal and refitting

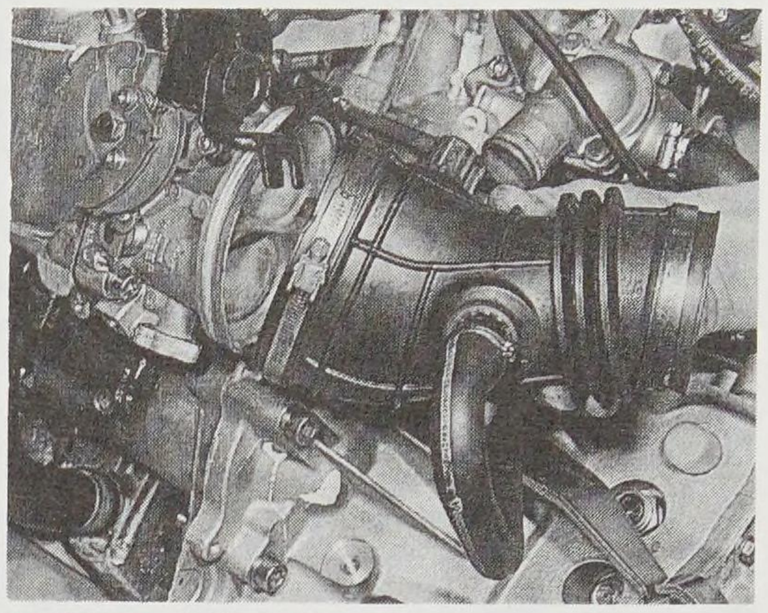
1 Remove the injection unit as described in Section 32.
2 Disconnect the accelerator cable from the throttle housing as described in Section 24.
3 Either drain the cooling system or hand-clamp the coolant hoses as close as possible to the throttle housing, then disconnect the coolant inlet hose (photo).
4 Disconnect the throttle switch wiring multi-plug (photo).
5 Slacken the clip and detach the plastic duct from the throttle housing (photo).
6 Disconnect the coolant return hose, distributor vacuum hose and breather hose from the throttle housing (photo).
7 Remove the four Allen bolts and remove the throttle housing (photo).
8 Refit in reverse order using a new gasket.
9 Top up, and if necessary bleed, the cooling system.



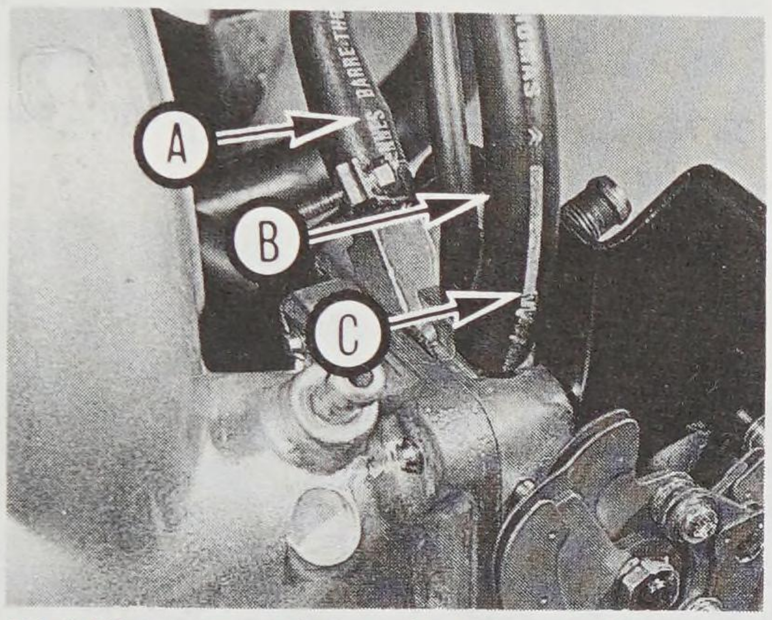
31.3 Disconnect the coolant inlet hose



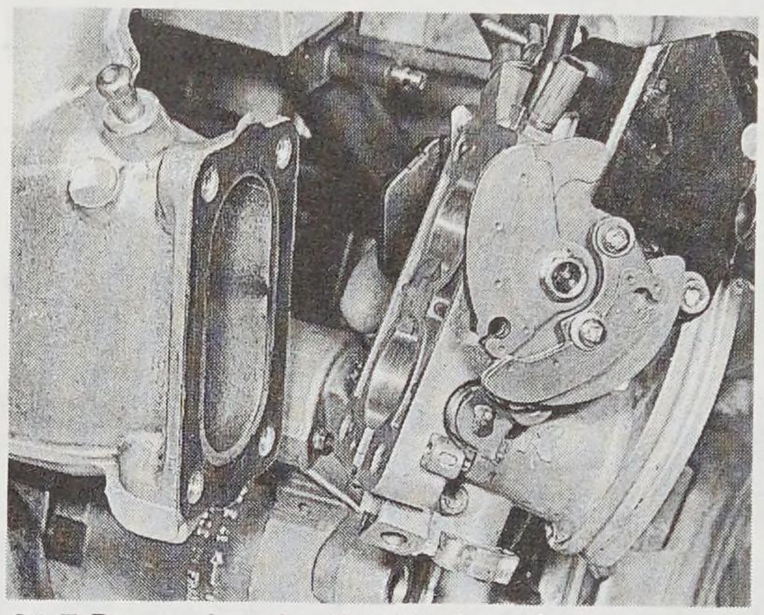
31.4 Disconnect the multi-plug



31.5 Detach the plastic duct



31.6 Disconnect the coolant return (A), distributor vacuum hose (B) and breather hose (C)



31.7 Removing the throttle housing

32 Injection unit/airflow meter – removal and refitting

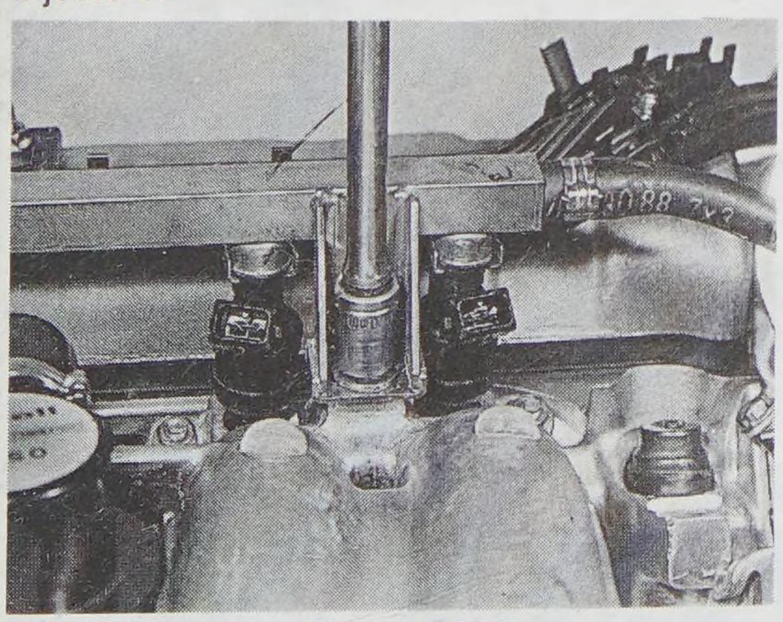
The injection unit/airflow meter is removed with the air filter cover as described in Section 27.

33 Fuel rail and injectors – removal and refitting

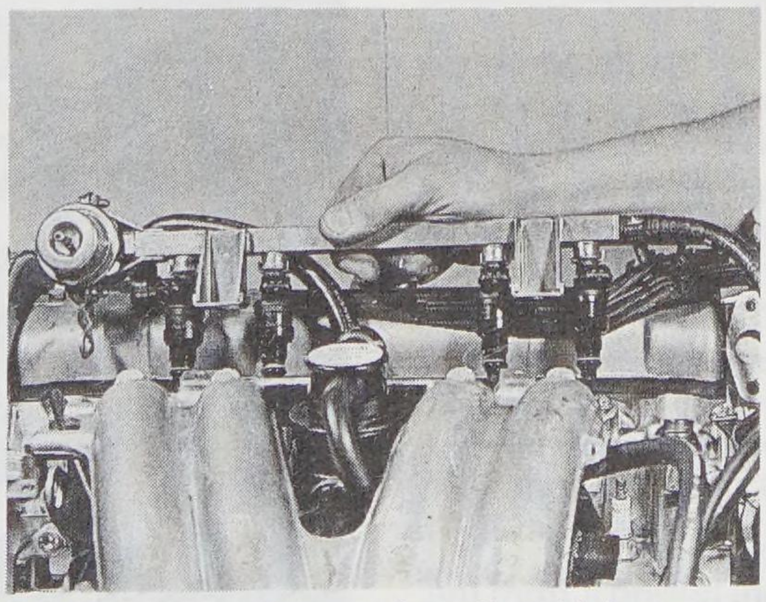
1 Refer to Section 23, read the precautions and depressurise the system before starting work.
2 Disconnect the sensor pipe on the fuel pressure regulator and remove the bolt from the regulator support bracket on the inlet manifold.
3 Number the injector electrical plugs then disconnect them from the injectors.
4 Disconnect the inlet and outlet fuel hoses, being prepared for any fuel spillage.
5 Unbolt the fuel rail and pull it and the injectors upward to release them from the cylinder head (photos).
6 Pull out the clips securing the injectors to the fuel rail and pull out the injectors. Number them for refitting in the same positions (photo).
7 Check the condition of the O-ring seals and renew them as necessary (photo).
8 Clean the injector nozzles using injector cleaning fluid.
Note: *Fouling of the injector nozzles can cause the following symptoms*

- *(a) difficult hot starting*
- *(b) persistent stalling*
- *(c) misfiring when cold*
- *(d) misfire when hot between 1000 and 2000 rpm*
- *(e) loss of performance*

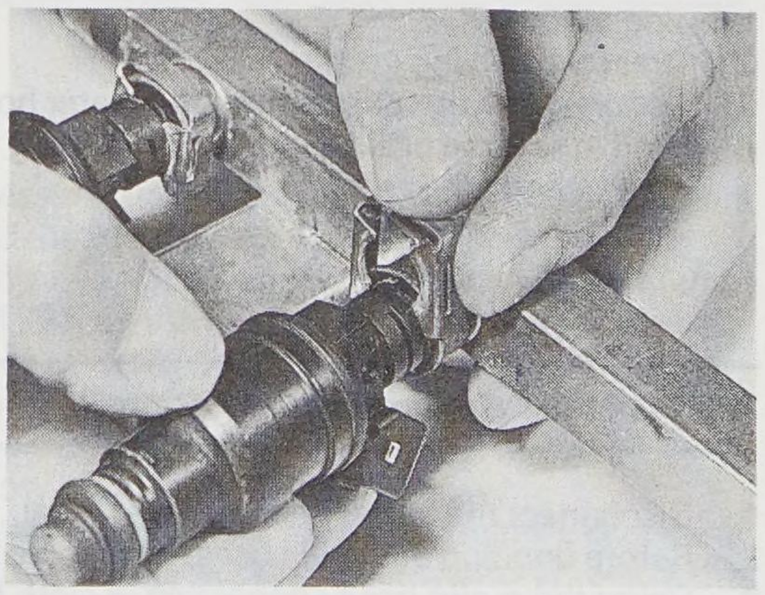
9 Refitting is a reversal of removal.



33.5A Removing a fuel rail bolt ...



33.5B ... and pulling up the rail and injectors



33.6 Removing an injector from the fuel rail

34 Fuel pressure regulator – removal and refitting

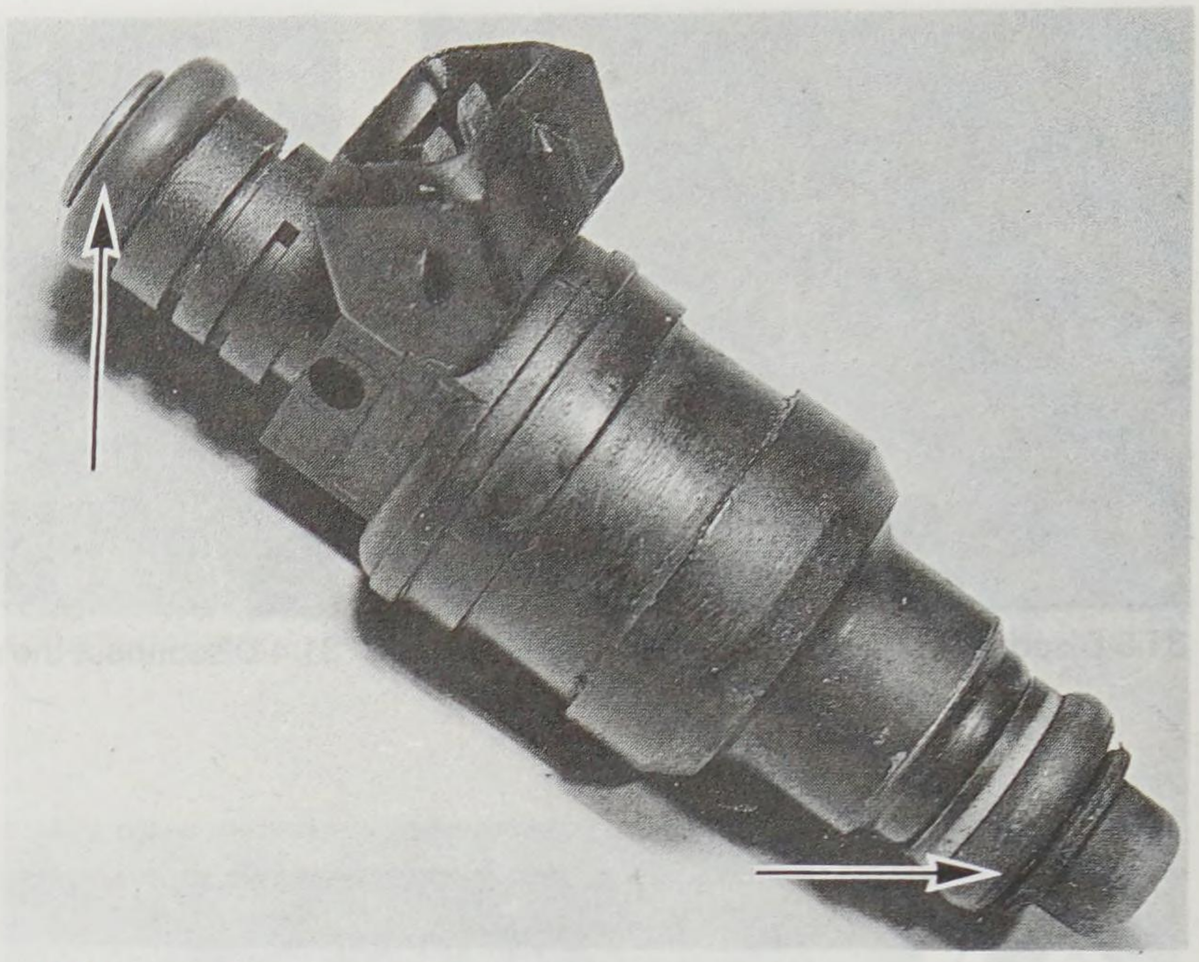
1 Depressurise the system as described in Section 23.
2 Disconnect the sensor pipe (photo).
3 Disconnect the fuel hose (photo).
4 Remove the bolt from the support bracket on the inlet manifold.
5 Unbolt and remove the regulator from the fuel rail (photo).
6 Refit in reverse order.

35 Fuel pump damper – removal and refitting

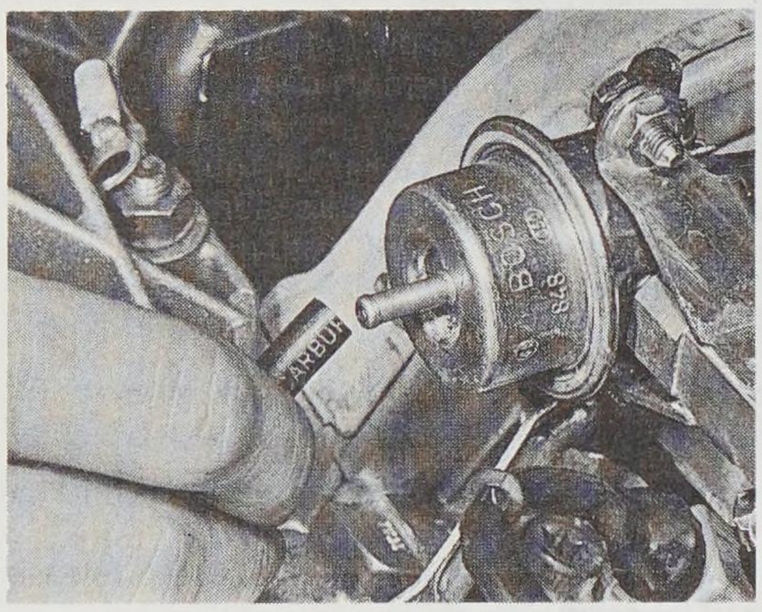
1 Depressurise the system as described in Section 23.
2 Disconnect the fuel hose unions from the damper (photo).
3 Unscrew the nut securing the damper to the support bracket and remove the damper.
4 Refit in reverse order.

36 Supplementary air device – removal and refitting

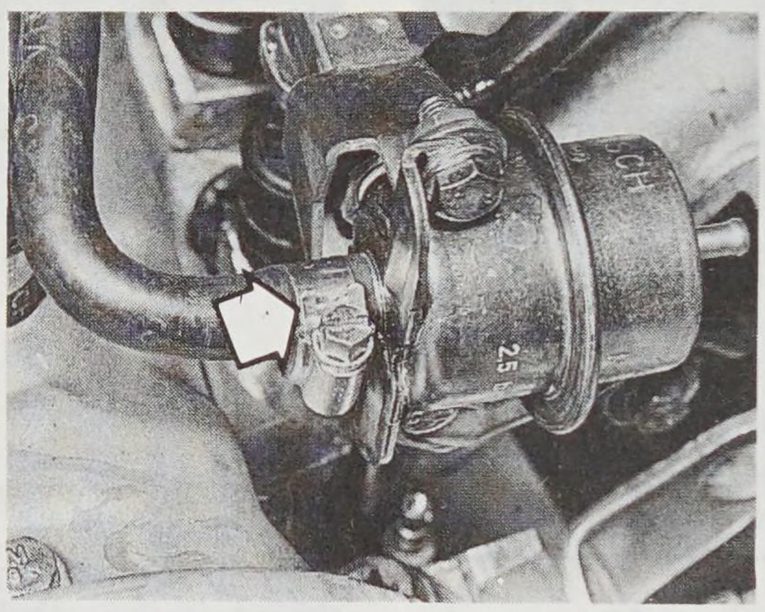
1 Disconnect the battery then remove the battery and battery tray.
2 Remove the nuts securing the water housing to the cylinder head.
3 Disconnect the electrical plug and air hoses from the air device (photo).



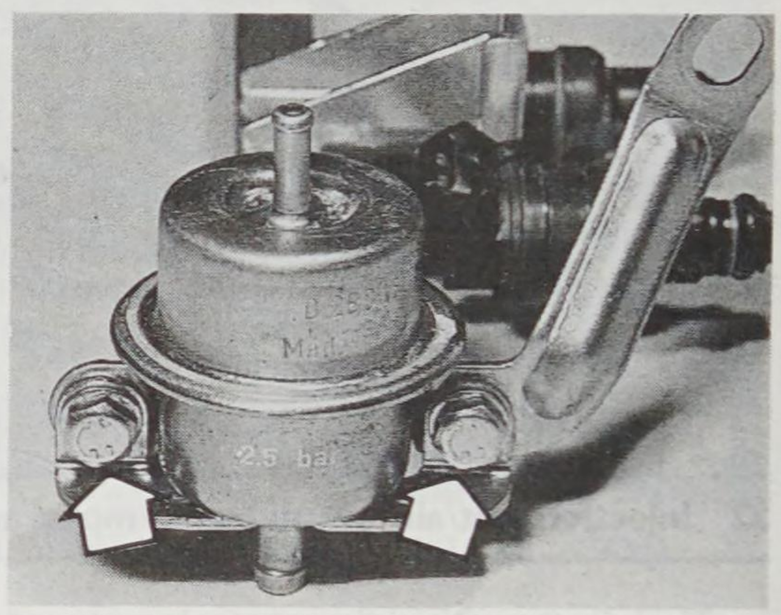
33.7 Injector O-ring seals (arrowed)



34.2 Disconnecting the sensor pipe



34.3 Fuel hose connection (arrowed)



34.5 Regulator-to-fuel rail bolts (arrowed) – assembly removed for clarity

4 Tilt the water housing to gain access to the air device securing bolts and remove the bolts and air device.
5 Refit in reverse order.

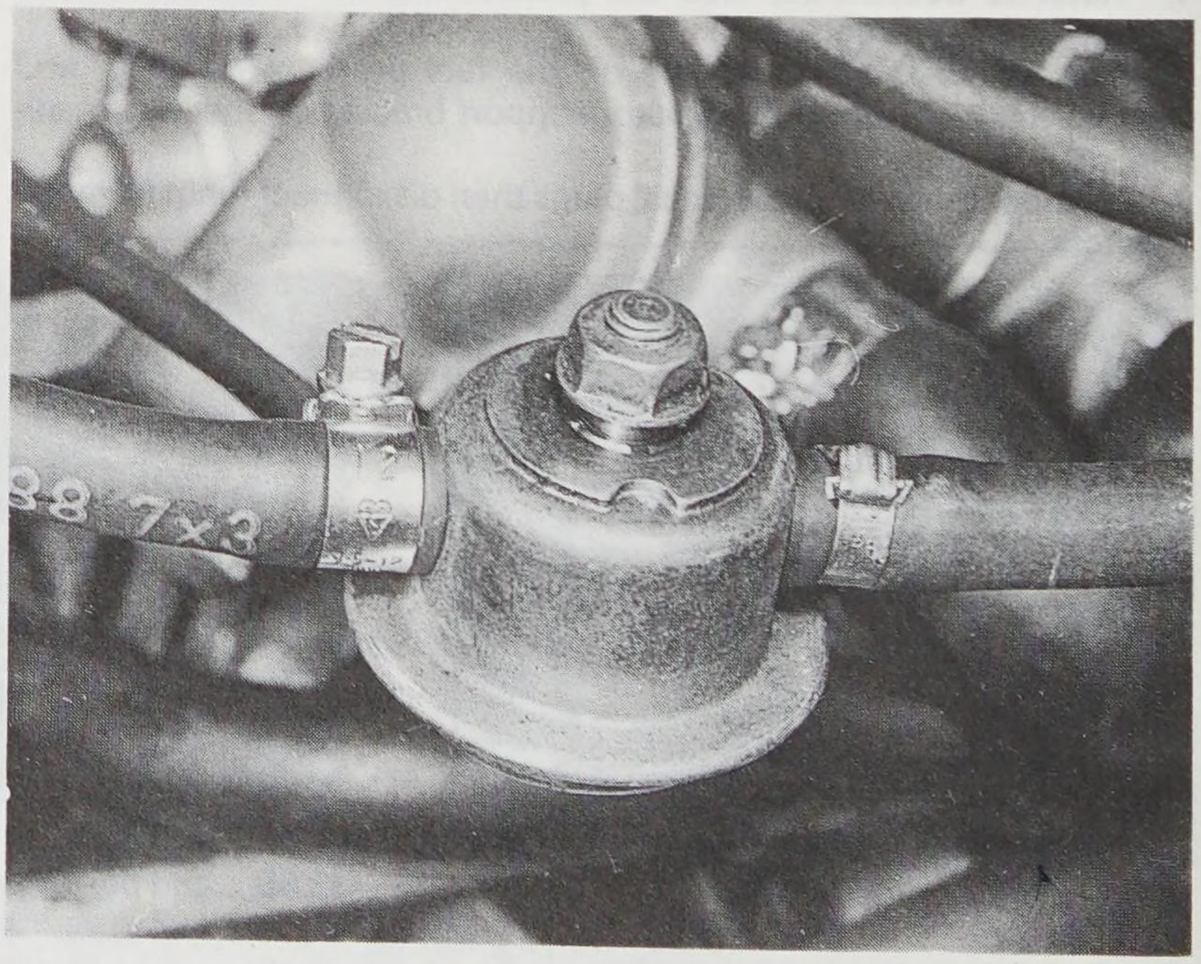
37 Injection thermistor – removal and refitting

1 Disconnect the electrical plug from the thermistor on the water housing (photo).
2 Drain the cooling system.
3 Unscrew the thermistor from the water housing.
4 Refit in reverse order, using a new sealing washer.
5 Top up and bleed the cooling system.

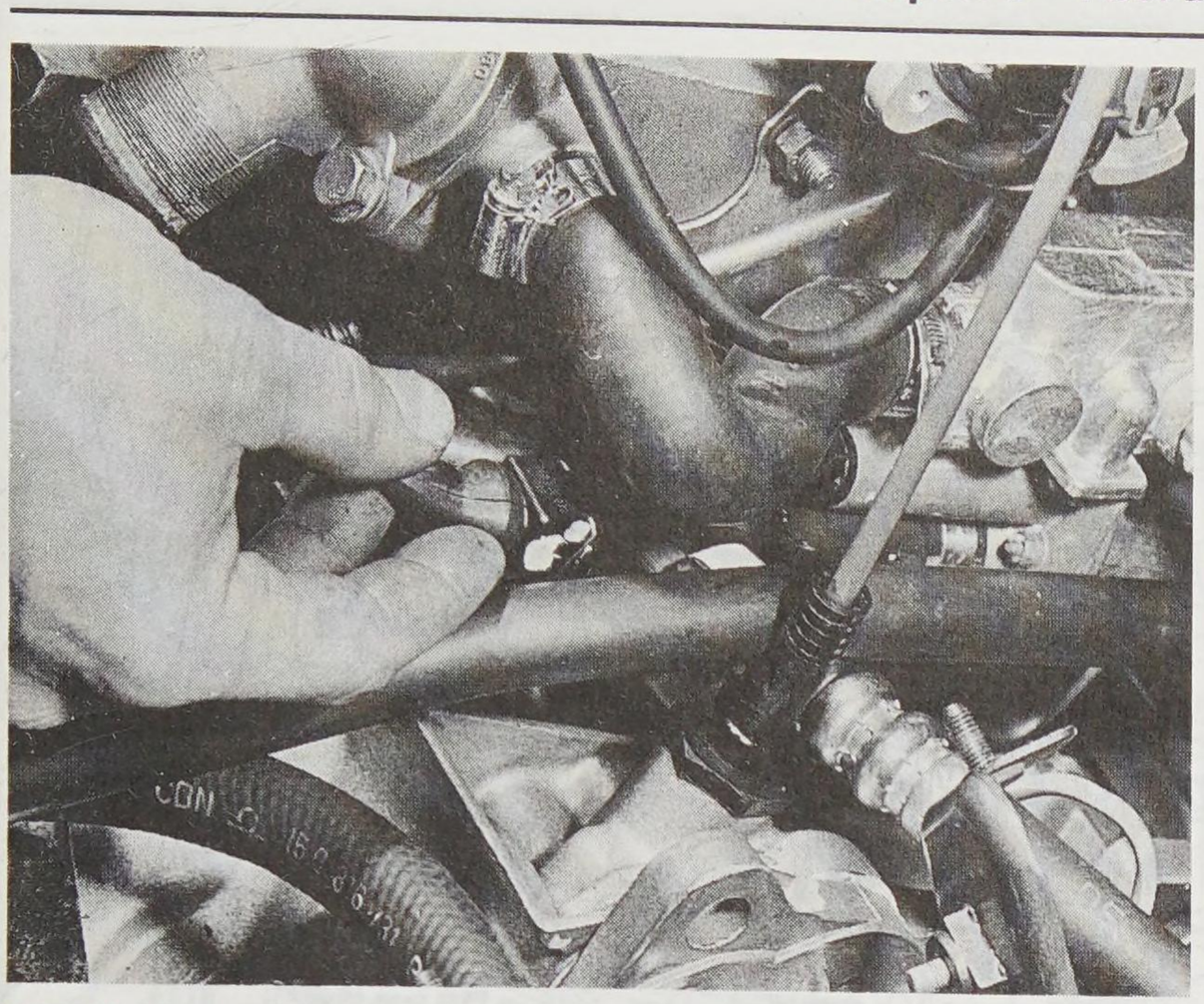
38 Fuel filter – removal and refitting

1 Disconnect the battery negative terminal.
2 Before undoing any fuel hoses, refer to Section 8.
3 Cover the outlet hose connection in cloth before pulling it from the filter and feed its end into a suitable container to catch residual fuel – this will depressurise the system.
4 Disconnect the inlet hose (photo).

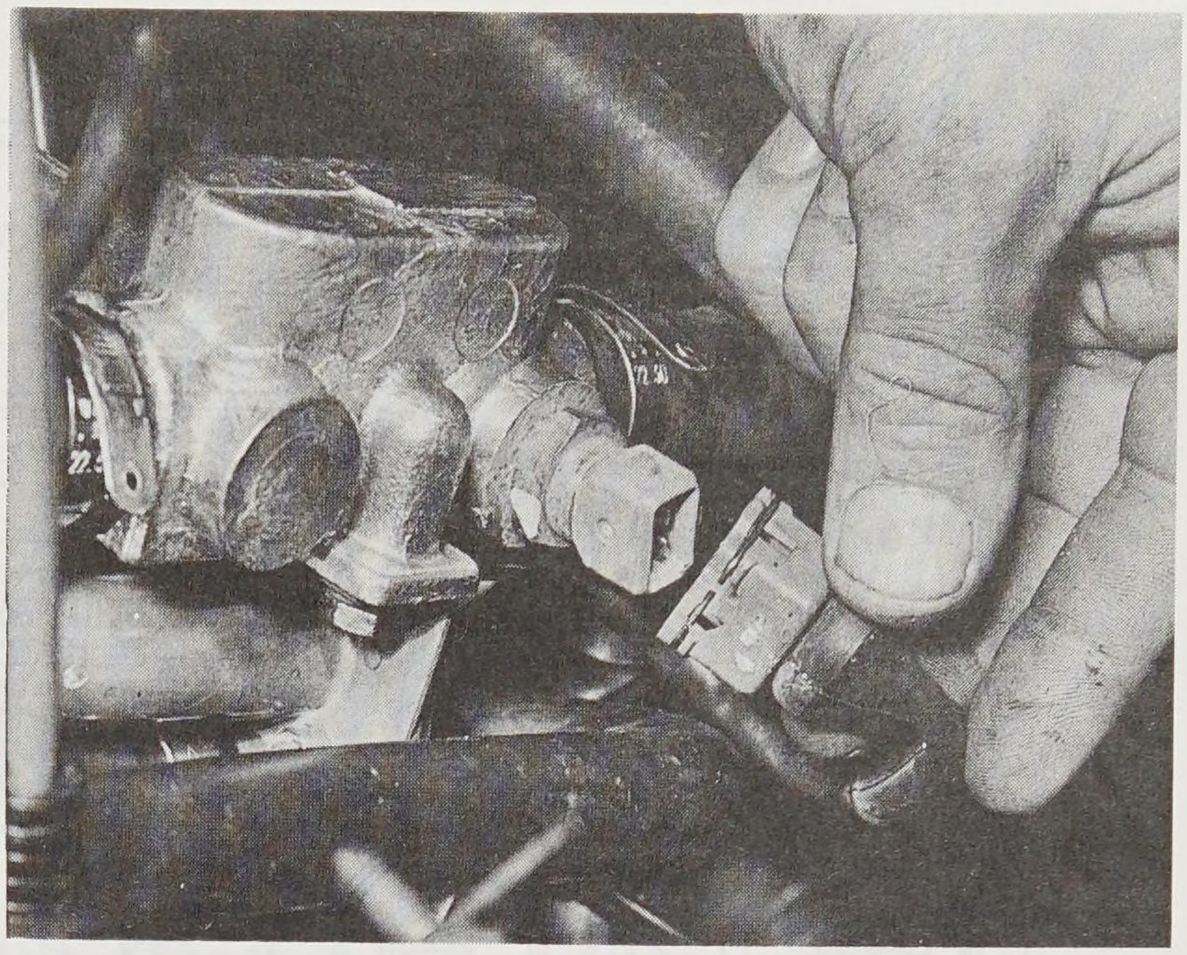
5 Loosen the rubber mounting strap clamp nut and slide the filter from the clamp.
6 Refit in reverse order, ensuring any directional arrows on the filter are facing the direction of fuel flow.



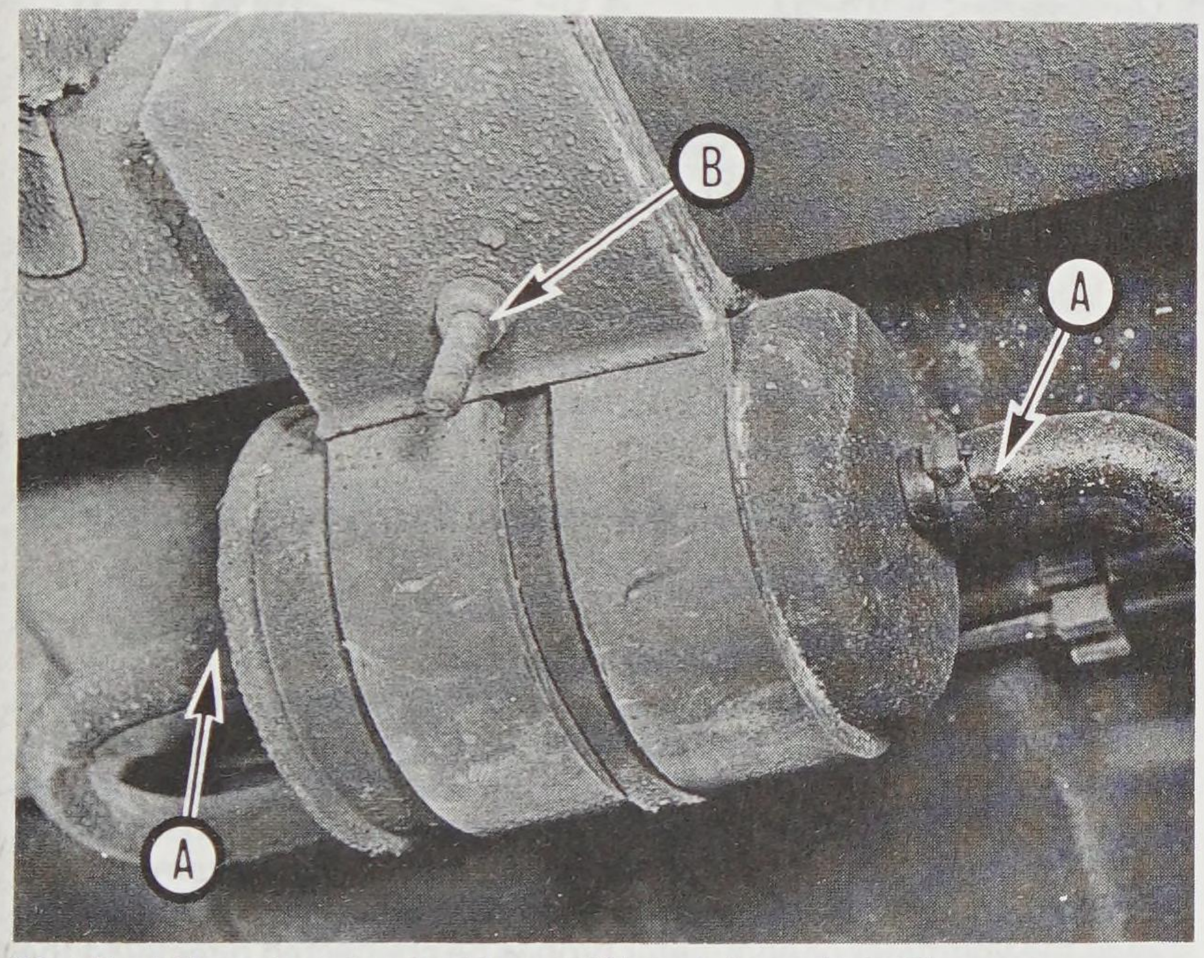
35.2 Fuel pump damper showing fuel hose connections



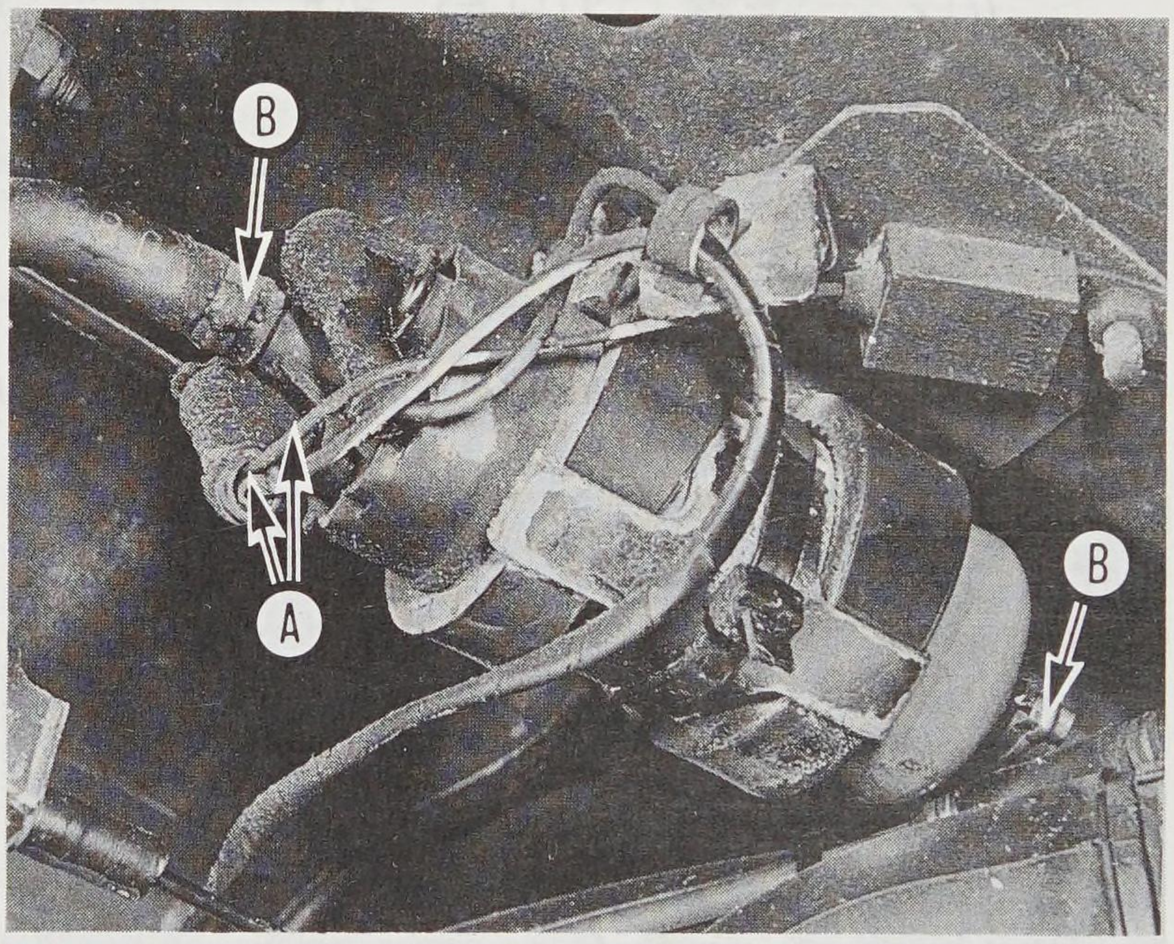
36.3 Disconnecting the supplementary air device plug



37.1 Disconnecting the injection thermistor wiring



38.4 Fuel filter showing fuel hoses (A) and clamp bolt (B)



39.3 Fuel pump showing electrical connections (A) and fuel hoses (B)

39 Fuel pump – removal and refitting

1 Disconnect the battery negative terminal.
2 Refer to Section 23, read the safety precautions and depressurise the system.
3 Disconnect the electrical connections on the pump (photo).
4 Disconnect the inlet and outlet fuel hoses (refer to Section 8).
5 Cut through the plastic cable tie and slide the pump from the rubber mounting straps.
6 Refit in reverse order.

40 Air intake system – checking for leaks

1 For the correct operation of the airflow sensor there must be no air entering the system upstream of the sensor.
2 Check that there is no leakage at the points arrowed in Fig. 3.16 or at the inlet manifold gasket.
3 If an air line is available, disconnect the airflow sensor inlet hose and use an adaptor to blow air through the intake system while fully opening the throttle, blocking the exhaust pipe and pinching the crankcase breather hose. If the points indicated in paragraph 2 are then brushed with soapy water any bad seals will be immediately evident.
4 Also check the supplementary air device and on vehicles without ABS the brake servo vacuum hose.

41 Fuel injection system – testing

Fuel pressure

1 If the engine will not run, first check the fuel pump fuse is intact (photo).
2 Connect a suitable pressure gauge into the inlet fuel hose between the fuel pump damper and the fuel rail.
3 Remove the fuel pump relay and connect a switchable test lamp between terminals 20 and 76A on the relay holder, with the switch off.
4 Disconnect the sensor pipe from the fuel pressure regulator.
5 Switch on the fuel pump (or start the engine if it will run).
6 The fuel pressure should be as specified.
7 If the pressure is too low, clamp the fuel return hose.
8 If the pressure now remains lower than 4 bar (58 lbf/in^2), check the electrical supply to the pump. If the supply is satisfactory, renew the pump.
9 If the pressure is higher than 4 bar (58 lbf/in^2), renew the pressure regulator.

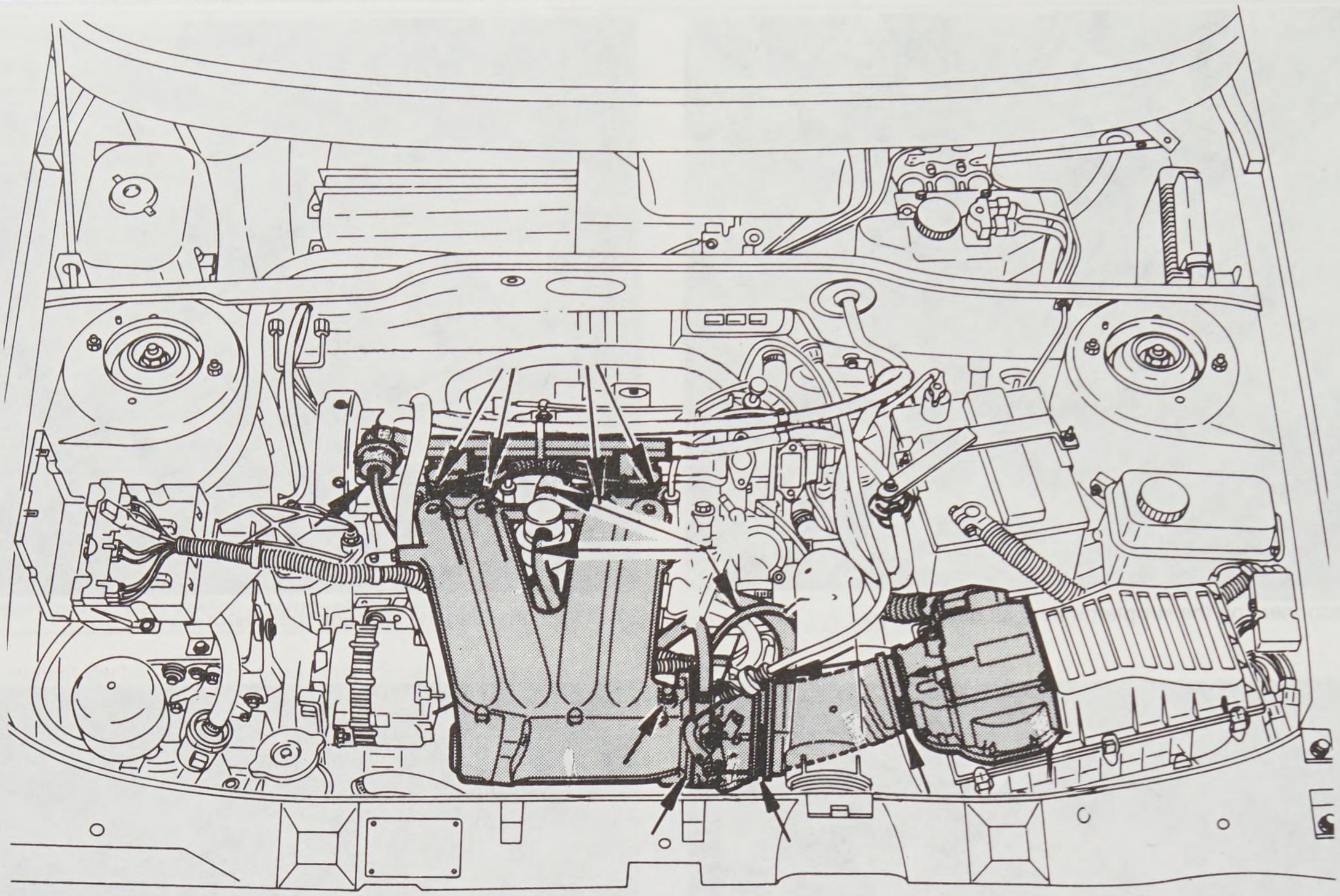
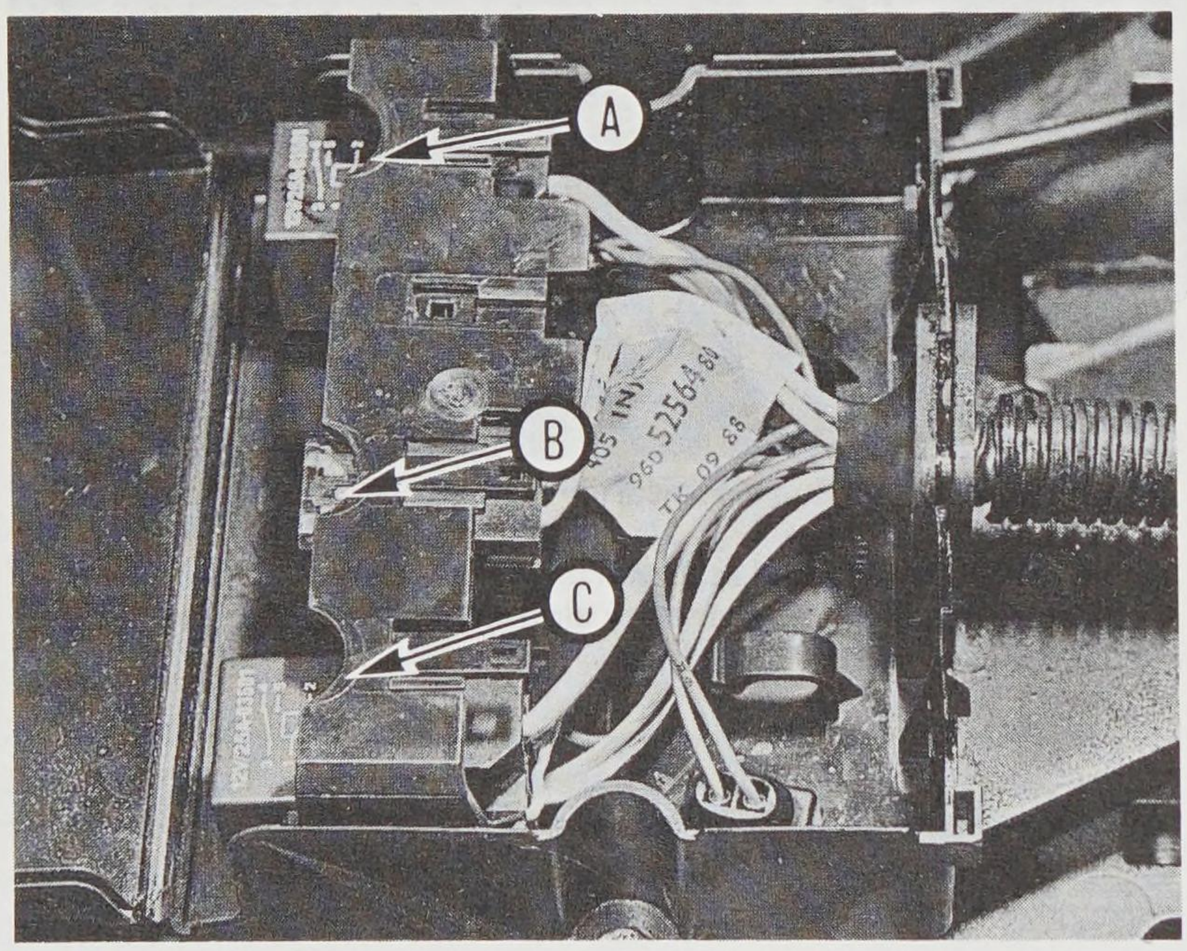


Fig 3.16 Checking air intake system for leaks – arrows indicate test points (L3.1) (Sec 40)



41.1 View inside relay box showing injection relay (A), fuel pump fuse (B) and pump relay (C)

10 If the pressure recorded in paragraph 6 above is higher than 2.7 bar (39 lbf/in^2), disconnect the return hose and position its end into a suitable container.
11 Run the pump or start the engine.
12 If the pressure returns to between 2.3 and 2.7 bar (33 to 39 lbf/in^2), check the condition of the fuel return hose to the tank which may be blocked or kinked.
13 If the pressure remains higher than 2.7 bar (39 lbf/in^2), renew the pressure regulator.
14 If the fuel delivery is incorrect check all delivery hoses for blockage or kinks. Also check the fuel filter is unblocked and correctly fitted.
15 Also check the filter in the fuel gauge sender unit.
16 Operate the switch fitted in paragraph 3 and check the electrical supply to the pump. If incorrect, renew the pump.

Checking the injection unit multi-plug terminals

17 To check the various supply signals to the injection unit, connect a voltmeter or ohmmeter, as applicable, to the wiring plug terminals indicated. These checks must be carried out with the plug disconnected from the injection unit and with the probe inserted into the back of the plug (wire input side). It will therefore be necessary to remove the protective cover from the plug for access. Under no circumstances should the voltmeter or ohmmeter probes be connected directly to the connector pins. The test results should be as shown. If incorrect, check the continuity of the relevant circuits/components and where possible their adjustment.

Test	Terminals	Requirements and values
Ignition signal	*1 and 5*	*12 + volts (ignition on)*
Supply to injection unit	*2 and 5*	*12 + volts (ignition on)*
Control signal to relay	*12 and 5*	*12 + volts (ignition on)*
Injectors	*3 and jump lead*	*Disconnect pump relay and connect jump lead to terminal 5 on relay block. Resistance should be 4 ohms (four injectors, or 16 ohms (one injector)*
Earth	*4, 5 and earth*	*Battery disconnected. Resistance = 1 ohm*
Injection thermistor	*8 and 5*	*Resistance:* *–10°C = 8200 to 11 000 ohms* *+20°C = 2280 to 2720 ohms* *+80°C = 290 to 370 ohms*

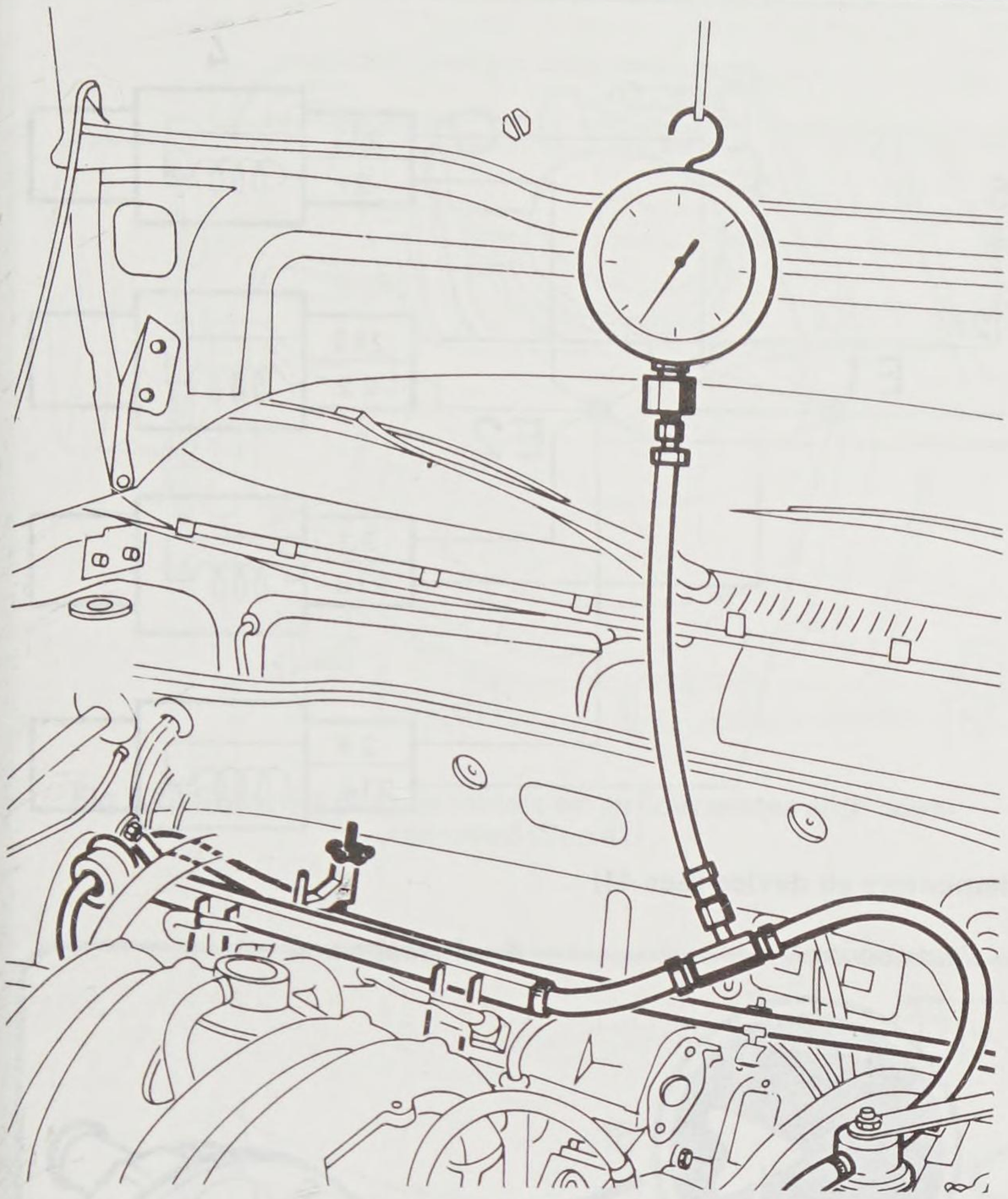


Fig 3.17 Fuel pressure test gauge connection (Sec 41)

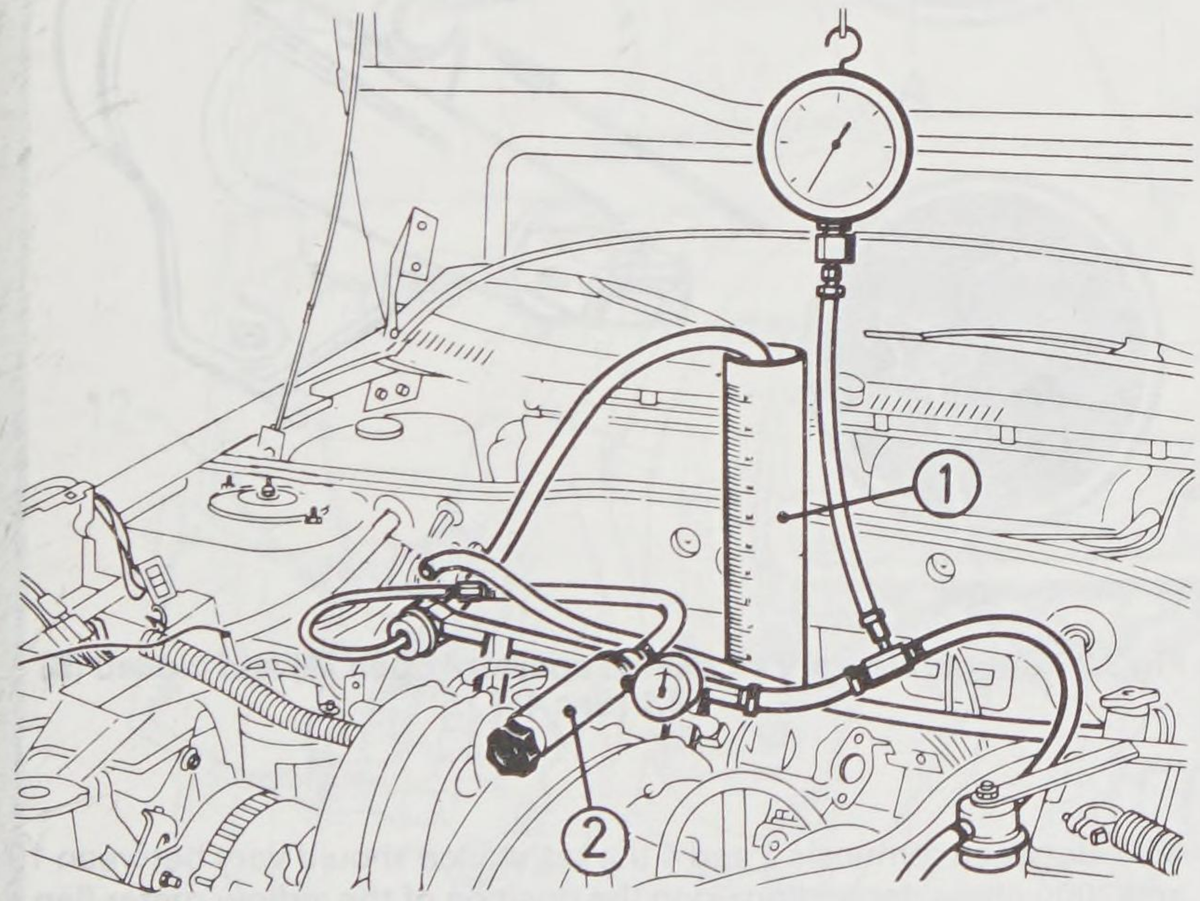


Fig 3.19 Test equipment for fuel delivery (Sec 41)

1 Beaker 2 Pump

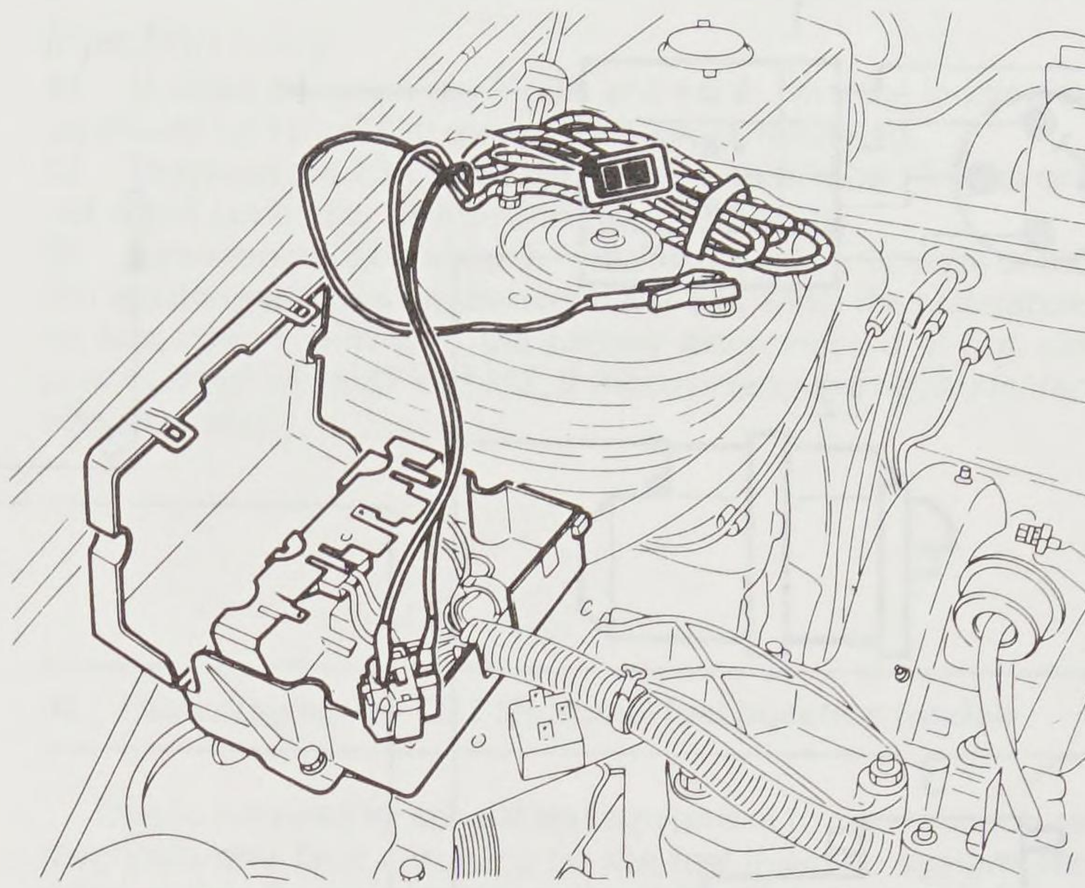


Fig 3.18 Test switch/lamp connector to relay terminal (Sec 41)

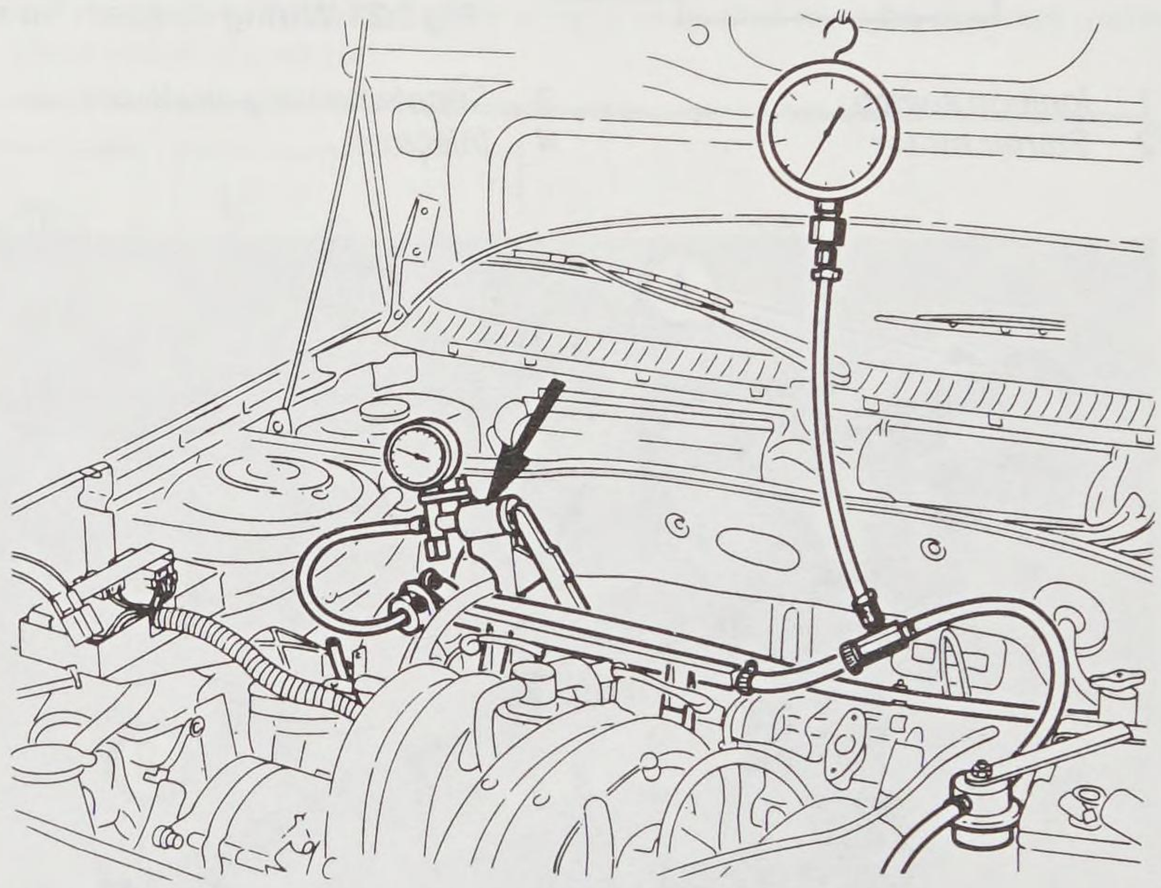


Fig 3.20 Test equipment for pressure regulator – vacuum pump arrowed (Sec 41)

Fuel delivery

18 Connect a pressure gauge and switch as described in paragraphs 2 and 3.
19 Disconnect the sensor pipe from the pressure regulator and connect a pressure pump to the regulator.
20 Using the switch, start the fuel pump, then by using the pump, allow the fuel pressure to increase to 3 bar (43 lbf/in^2).
21 Switch off the fuel pump.
22 Disconnect the fuel return pipe from the pressure regulator and fit a length of rubber tubing to the regulator connection, the end of which will reach into a graduated beaker.
23 Switch the fuel pump on for 15 seconds.
24 The fuel output in the beaker during this 15 second period should be greater than 540 cc.
25 If incorrect, refer to paragraphs 1 to 16.

Pressure regulator

26 Connect a pressure gauge and switch as described in paragraphs 2 and 3.
27 Switch the fuel pump on.
28 Note the fuel pressure.
29 Connect a vacuum pump to the regulator sensor pipe connection.
30 Apply a vacuum of 0.5 bar (7.0 lbf/in^2).
31 The fuel pressure should drop by the amount of vacuum applied.
32 If not, renew the regulator.

Supplementary air device

33 Connect a voltmeter between terminals 29 on the air device wiring plug and earth. With the injector wiring plugs disconnected, operate the starter motor. Voltage should be 9 volts or more. If not, check the continuity of air device and pump control relay.
34 With the battery and air device plug disconnected, resistance between terminal 46B on the air device and earth should be less than 1 ohm. If not check continuity of wire 46B.
35 Between both terminals on the air device resistance should be approximately 46 ohms at 20°C. Renew the air device if this is not the case.
36 With the air hoses disconnected, look through the hose unions on the air device body. At a temperature of 20°C, the aperture in the unit should be visible (photo).

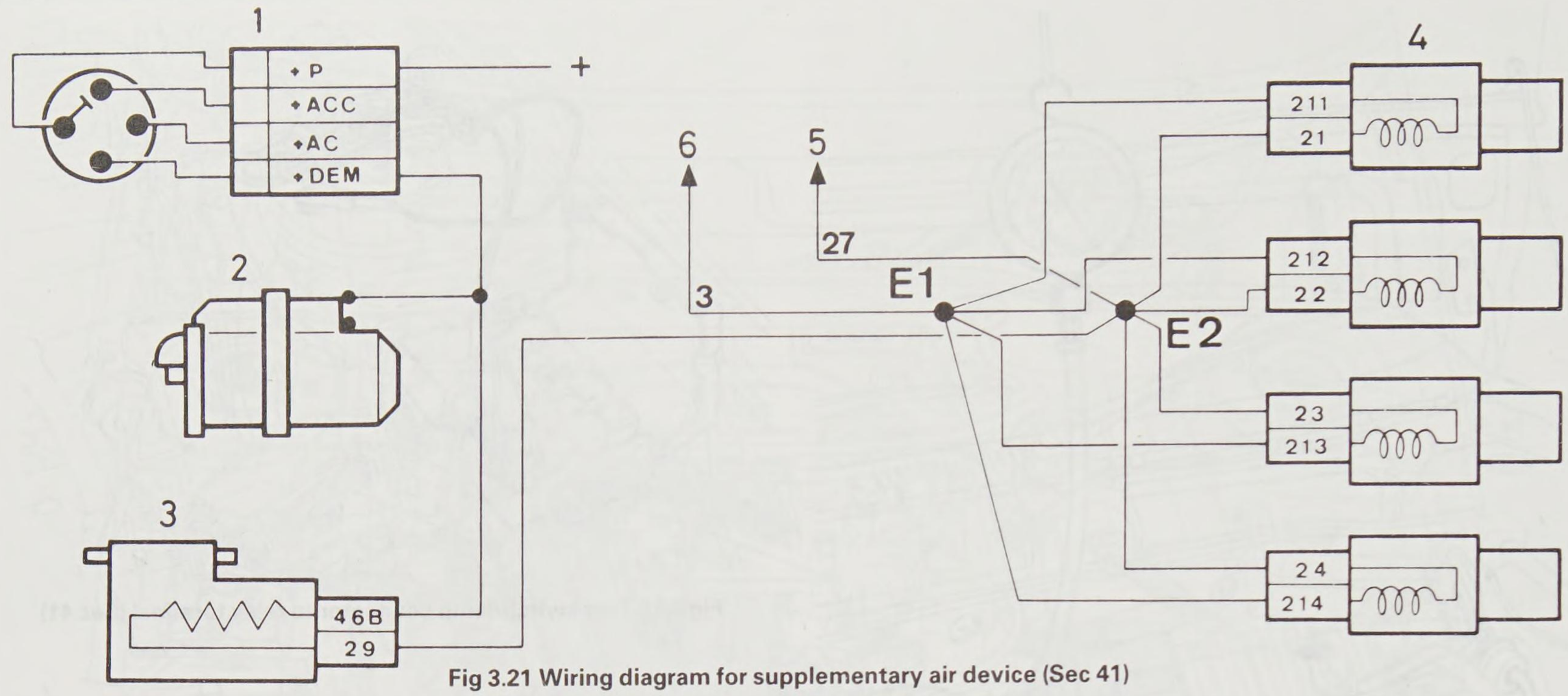
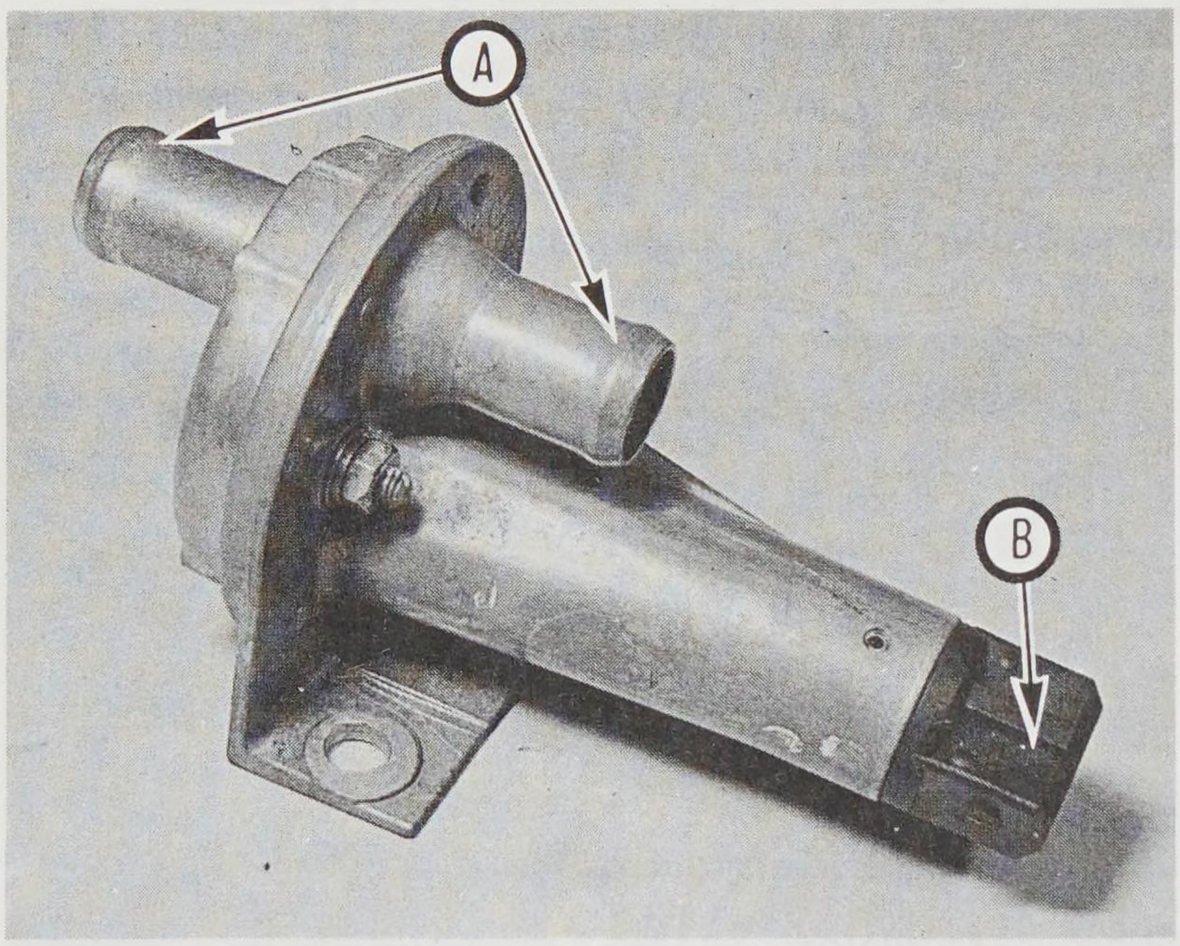


Fig 3.21 Wiring diagram for supplementary air device (Sec 41)

1 Ignition switch
2 Starter motor
3 Supplementary air device
4 Injectors
5 Pump control relay
6 Injection unit



41.36 Air hose unions (A) and electrical connection (B) on supplementary air device

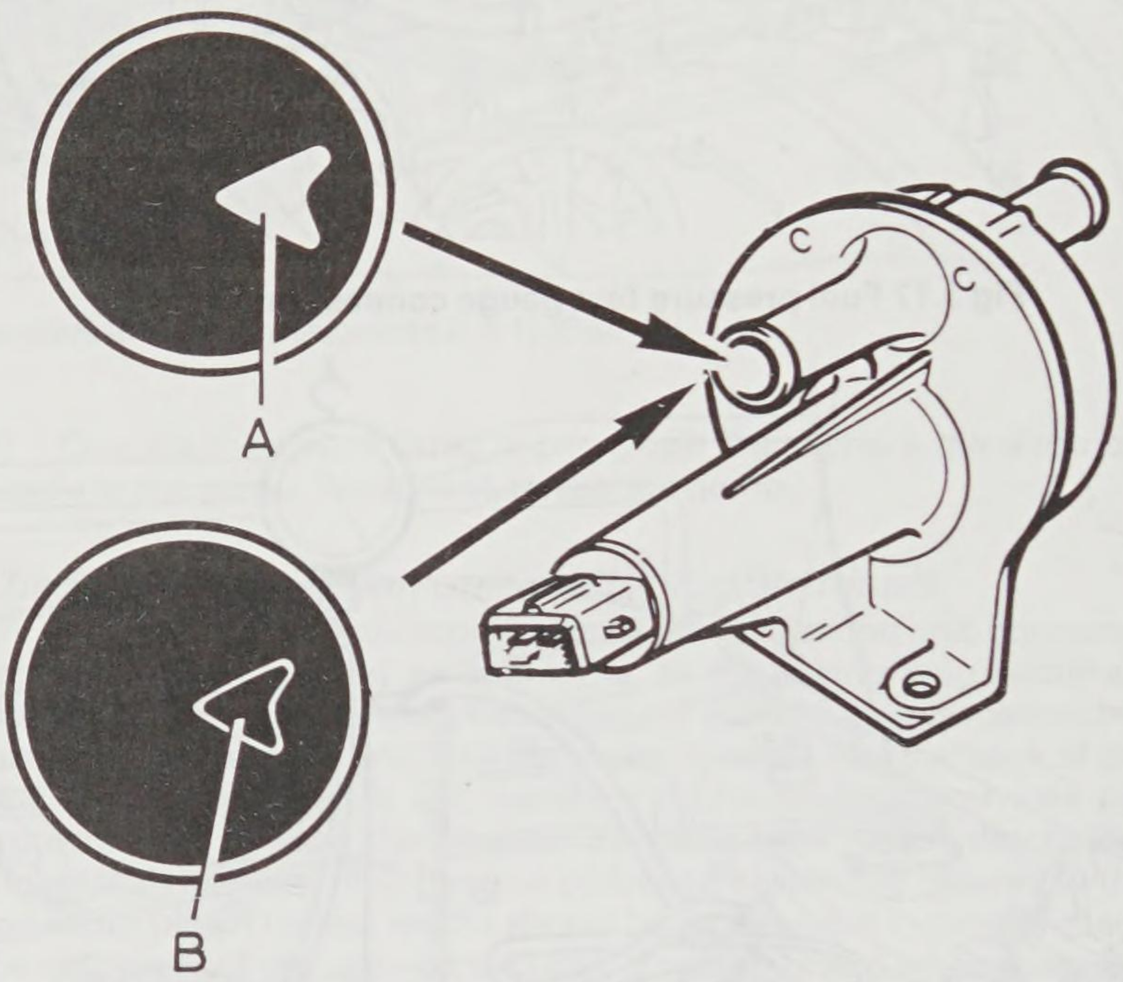


Fig 3.22 Supplementary air device aperture open (A) and closed (B) – L3.1 (Sec 41)

37 With the wiring plug disconnected, connect a 12 volt supply to the two terminals on the air device (positive to the left). Five minutes after switching on the supply the aperture in the air device should be completely closed. If this is not the case, renew the unit.

Airflow meter

38 Disconnect the battery and the injection unit multi-plug.
39 Remove the air filter cover and injection unit.
40 Remove the cover from the top of the injection unit/airflow meter.
41 To check the intake air temperature thermistor, connect an ohmmeter between terminals 1 and 3 on the injection unit.
42 Resistance should be as follows:

−10°C = 8260 to 10 560 ohms
+20°C = 2280 to 2720 ohms
+80°C = 760 to 910 ohms

43 To check internal resistances connect the ohmmeter between terminals 2 and 3. Resistance should be 10 to 200 ohms, and between terminals 3 and 4, 500 to 1000 ohms.

44 Between terminals 2 and 4 the resistance should vary between 10 and 2000 ohms depending upon the position of the airflow meter flap.

Control signal to fuel pump

45 Resistance between the negative terminal on the pump and earth with the battery disconnected should be 1 ohm or less.
46 Between the positive terminal and earth with the starter motor energised there should be a voltage of 9 volts or more.
47 If either of these readings is incorrect, check the continuity of wires M76, 76 and 76A and the fuel pump fuse.

Fuel pump relay

48 Voltage between pin 76A and earth with the starter motor energised should be 9 volts or more. If not, check the following.
49 Between pin 20 and earth voltage should be 12 volts or more. If lower, check continuity of wire 20 from the battery.
50 Between pin 2R and earth and pin 12 and earth, voltage should be 12 volts or more with the ignition switched on. If not check continuity of wire 12 from the injection unit and check the injection relay. If these tests prove positive, renew the fuel pump relay.

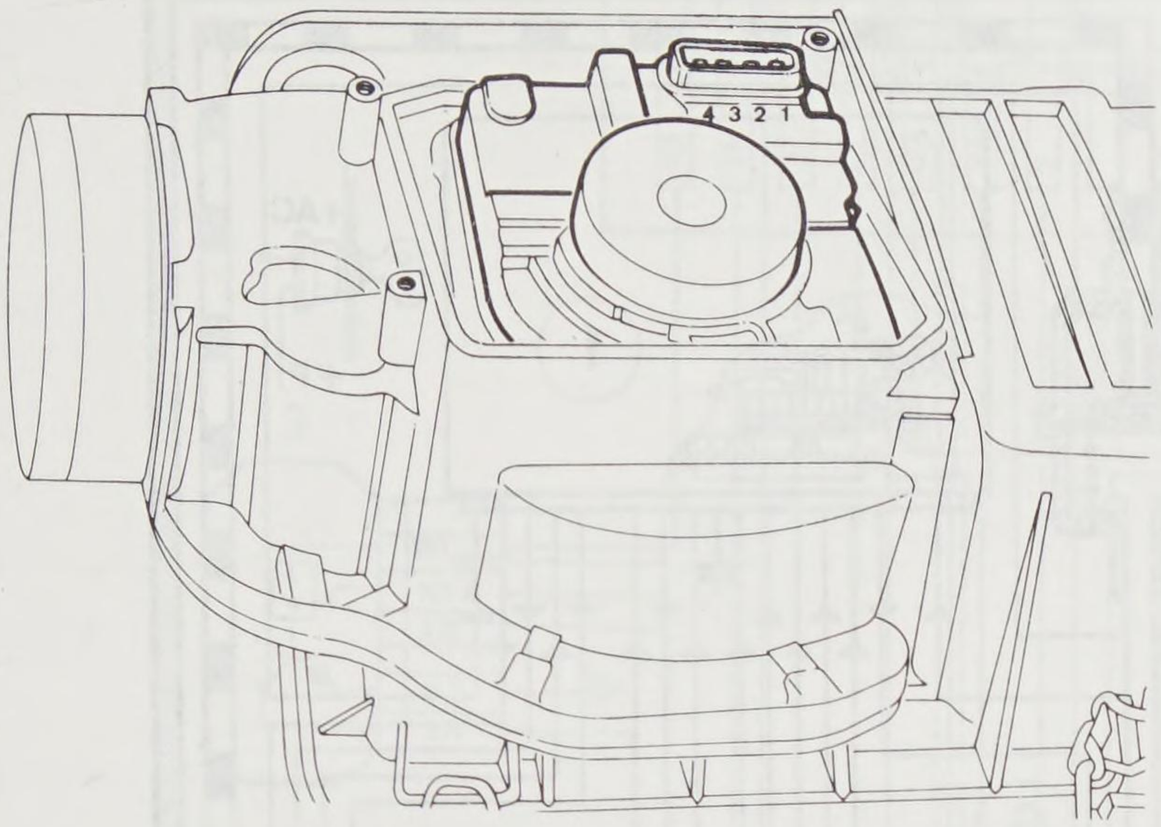


Fig 3.23 Showing plug terminals on airflow meter with cover removed (Sec 41)

Injection relay

51 Voltage between pin 2R/2A and earth with the ignition switched on should be 12 volts or more. If not, check following.

52 Between pin 20A and earth voltage should be 12 volts or more. If not check continuity of wire 20A from the battery.

53 Between pin 32 and earth, voltage should be 12 volts or more with the ignition switched on. Between M2 and earth the resistance should be less than 1 ohm with the battery disconnected. If not, check the continuity of wires 32 and M2. If these checks are negative, renew the injection relay.

42 Fault diagnosis – L3.1 (Jetronic) fuel injection models

Due to the need for special test equipment to carry out accurate fault diagnosis, any fault occurring on the fuel injection system should be referred to a Peugeot dealer or Bosch fuel injection specialist. Before doing this, however, make sure that the problem is not being caused by a disconnected or damaged hose or vacuum line, loose or disconnected wiring plug, or by some other simple fault that may be obvious under close visual inspection.

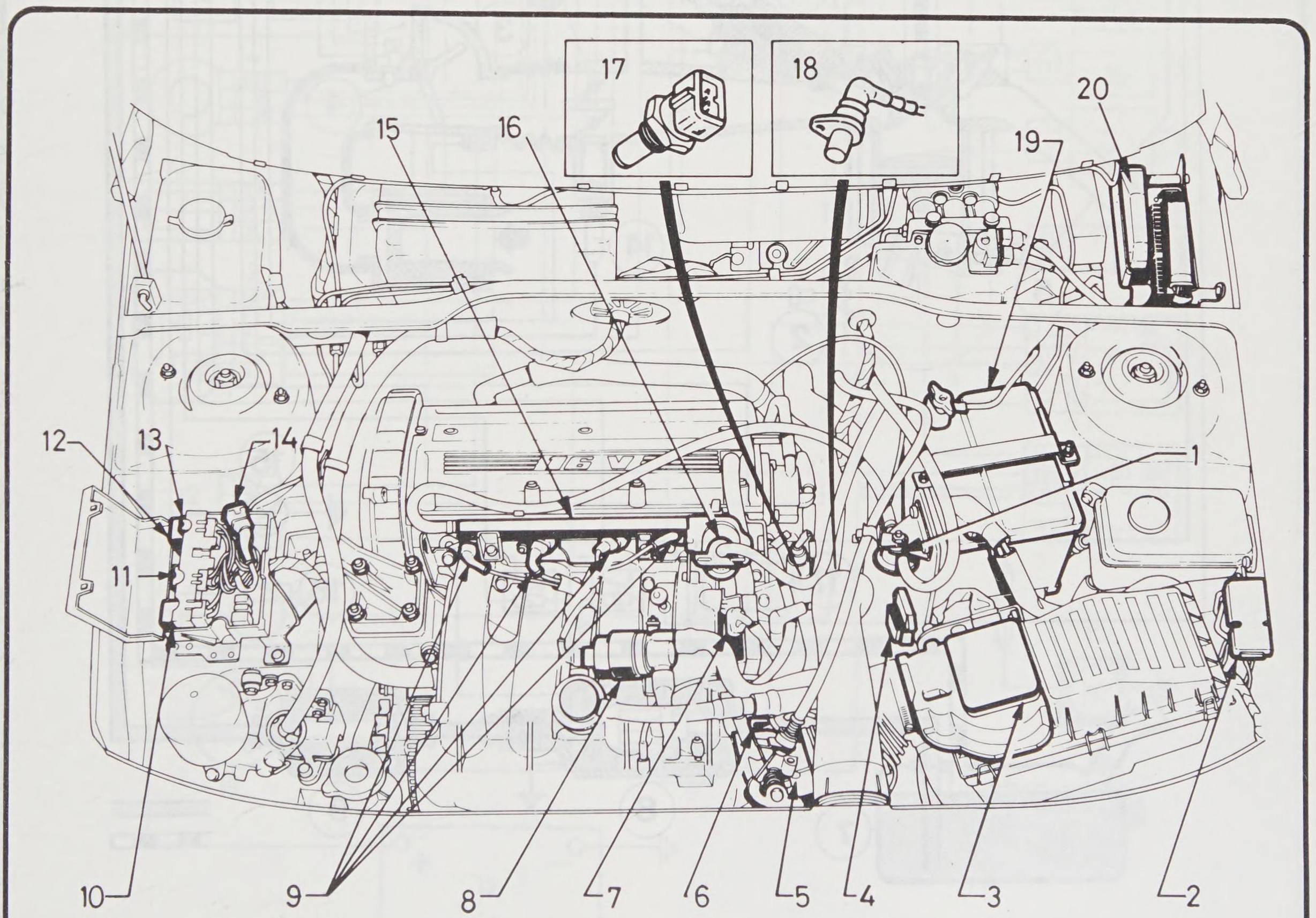


Fig 3.24 Component location of Bosch Motronic fuel injection system (Sec 43)

1 *Pulse damper*
2 *Battery positive unit*
3 *Airflow meter*
4 *Ignition amplifier module*
5 *Throttle housing*
6 *Throttle switch unit*
7 *Ignition coil*
8 *Idle speed regulator*
9 *Injectors*
10 *Injector supply relay*
11 *Electronic control unit supply fuse*
12 *Pump control relay*
13 *Fuel pump fuse*
14 *Diagnostic socket*
15 *Fuel rail*
16 *Fuel pressure regulator*
17 *Injection thermistor*
18 *Engine speed and TDC sensor*
19 *Battery*
20 *Electronic control unit*

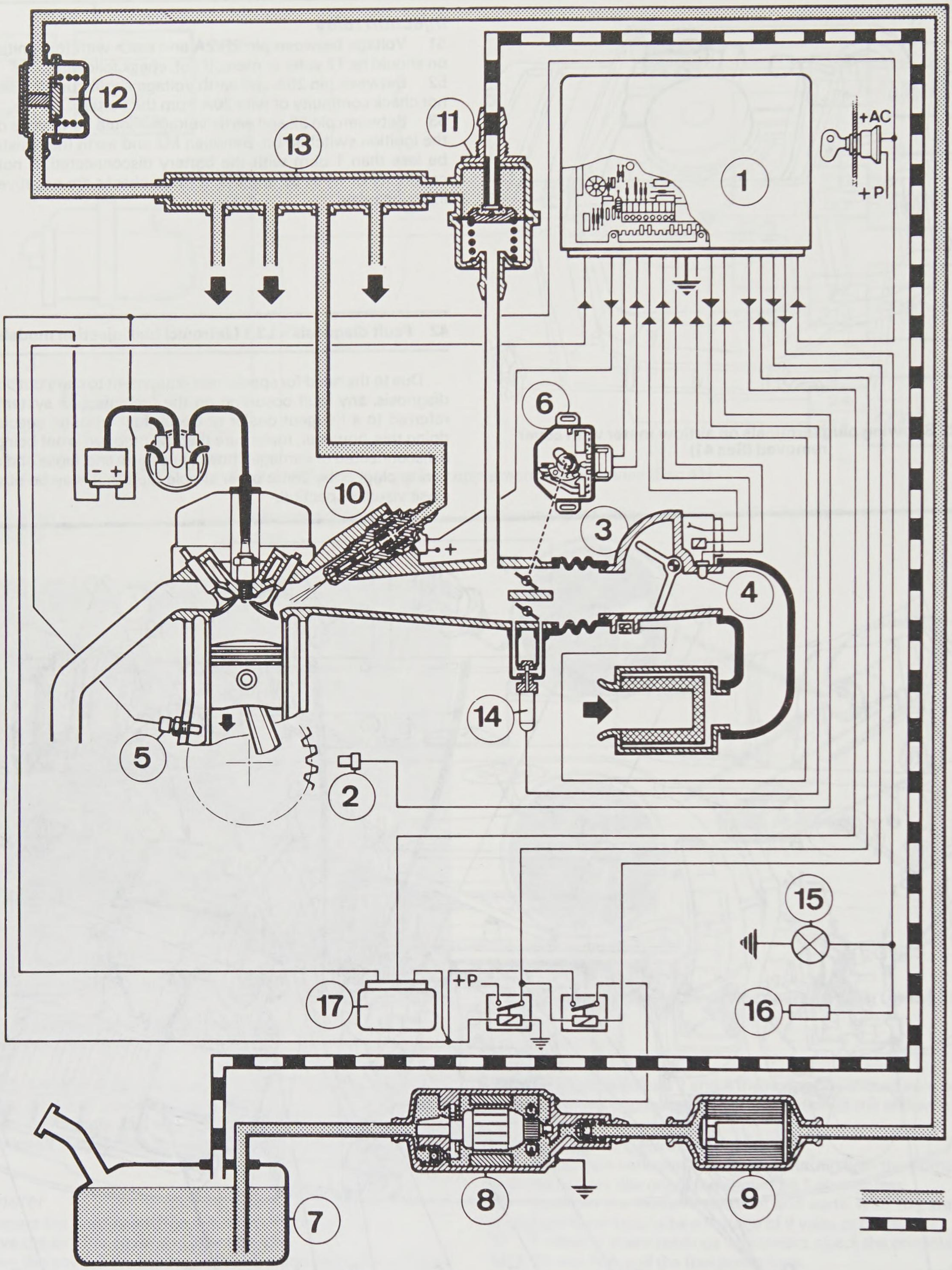


Fig 3.25 Schematic diagram of Bosch Motronic fuel injection system (Sec 43)

1 *Electronic control unit*
2 *Engine speed and TDC sensor*
3 *Airflow meter*
4 *Intake air temperature thermistor*
5 *Injection thermistor*
6 *Throttle switch unit*
7 *Fuel tank*
8 *Fuel pump*
9 *Fuel filter*
10 *Injectors*
11 *Fuel pressure regulator*
12 *Pulse damper*
13 *Fuel rail*
14 *Idle speed regulator*
15 *Warning lamp*
16 *Diagnostic socket*
17 *Ignition amplifier module*

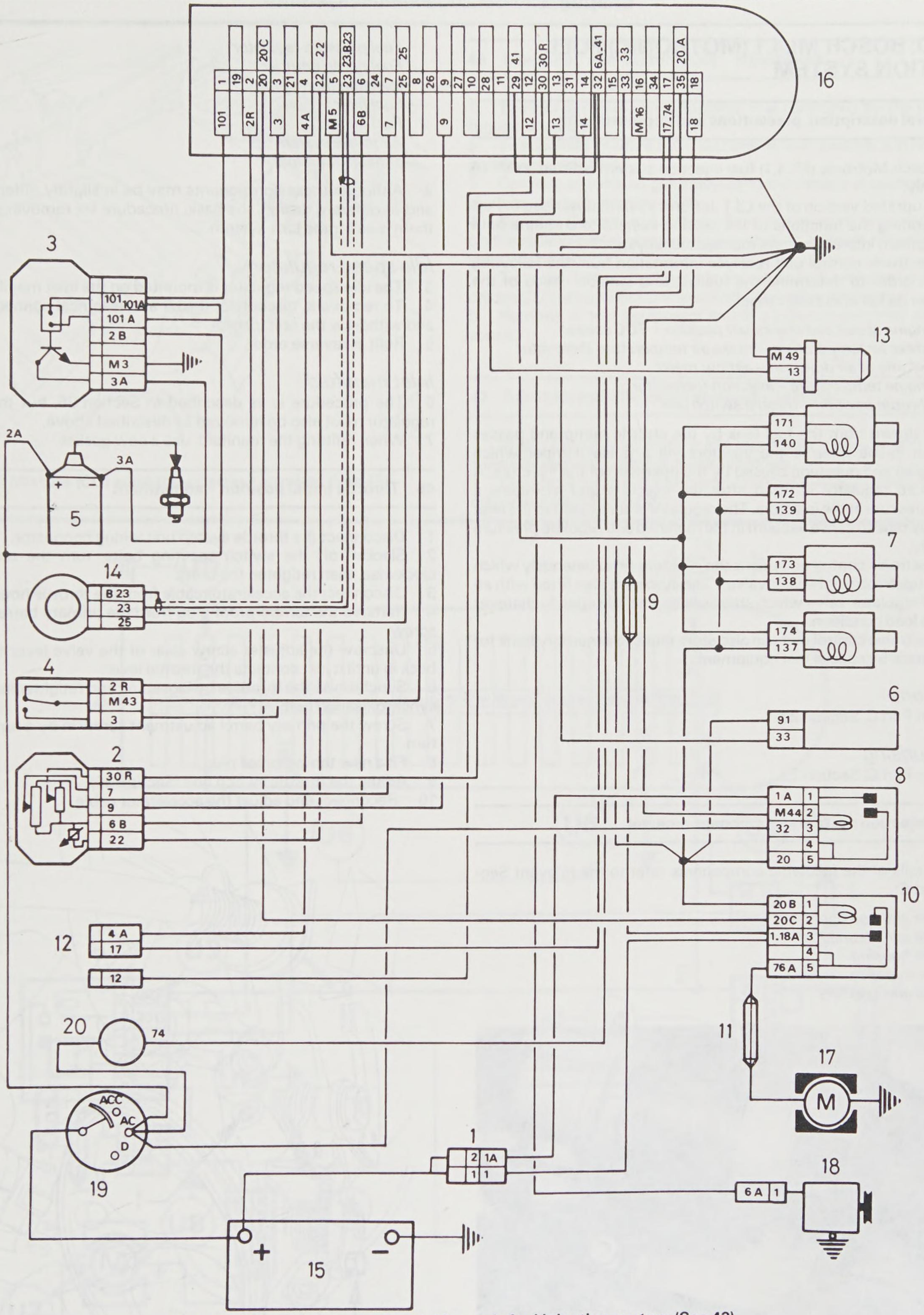


Fig 3.26 Wiring diagram for Bosch Motronic fuel injection system (Sec 43)

1 *Battery positive unit*
2 *Airflow meter*
3 *Ignition amplifier module*
4 *Throttle switch unit*
5 *Ignition coil*
6 *Idle speed regulator*
7 *Injectors*
8 *Injector supply relay*
9 *Electronic control unit supply fuse*
10 *Pump control relay*
11 *Fuel pump fuse*
12 *Diagnostic socket*
13 *Injection thermistor*
14 *Engine speed and TDC sensor*
15 *Battery*
16 *Electronic control unit*
17 *Fuel pump*
18 *Compressor (air conditioning)*
19 *Ignition switch*
20 *Diagnostic warning lamp*

PART D: BOSCH ML4.1 (MOTRONIC) FUEL INJECTION SYSTEM

43 General description, precautions and depressurising

The Bosch Motronic (ML4.1) fuel injection system is fitted to Mi 16 models only.

It is an uprated version of the L3.1 Jetronic system described in Part C, incorporating the functions of the ignition system to combine both fuel and ignition into one engine management system.

The electronic control unit receives information from the following sources in order to determine the fuelling and ignition needs of the engine over its full operating range:

(a) *Engine speed and crankshaft position – TDC sensor*
(b) *Intake air temperature – intake air temperature thermistor*
(c) *Volume of air drawn in – airflow meter*
(d) *Engine temperature – injection thermistor*
(e) *Throttle position – throttle switch unit*

Fuel is drawn from the fuel tank by the electric pump and passes through an in-line filter to the injectors via a pulse damper which reduces noise and pulsation caused by the operation of the injectors. A fuel pressure regulator is fitted after the injectors and maintains a constant pressure at the injectors. The regulator is connected to the inlet manifold by pipe to sense vacuum in the manifold and regulate pressure accordingly.

The electronic control unit opens the injectors simultaneously which spray fuel upstream of the inlet valves. The system is also fitted with an idle speed regulator valve which stabilises engine idle speed whatever the engine load condition.

The electronic control unit can also store faults in a memory bank for later diagnosis by special test equipment.

Precautions

Refer to Part C, Section 23.

Depressurising

Refer to Part C, Section 23.

44 Fuel injection system – component renewal

1 For details of the following components refer to the relevant Sections in Part C:

Air filter and housing
Throttle switch unit
Throttle housing
Airflow meter
Fuel rail and injectors
Fuel pressure regulator
Fuel pump damper
Injection thermistor
Fuel filter
Fuel pump
Air intake system
Exhaust manifold

2 Although these components may be in slightly different positions and of different design, the basic procedure for removing and refitting them is as for the L3.1 system.

Idle speed regulator

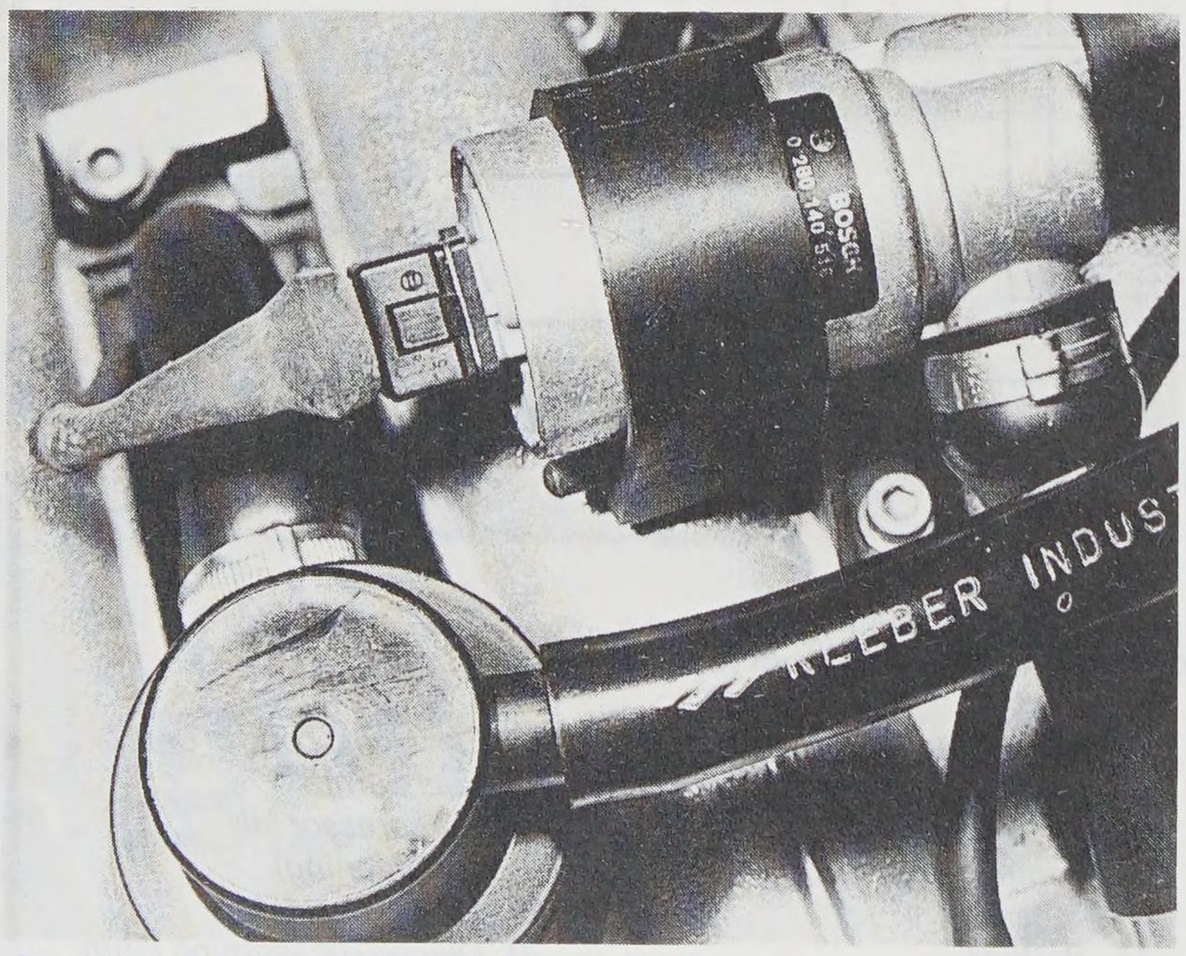
3 The idle speed regulator is mounted on the inlet manifold.
4 To remove it, disconnect the air and electrical connections, unbolt and withdraw the unit (photo).
5 Refit in reverse order.

Inlet manifold

6 The procedure is as described in Section 25, but the idle speed regulator must also be removed as described above.
7 When refitting the manifold, use a new gasket.

45 Throttle initial position – adjustment

1 Disconnect the throttle switch unit wiring connector.
2 Slacken off the switch securing bolts, turn the unit fully anti-clockwise, then retighten the bolts.
3 Disconnect the accelerator cable from the throttle housing.
4 Remove the tamperproof plug from the primary barrel adjustment screw.
5 Unscrew the adjuster screw clear of the valve lever then screw it back in until it just contacts the throttle lever.
6 Synchronise the throttles by loosening and retightening the throttle synchronisation bolt.
7 Screw the primary barrel adjustment screw in by a further quarter-turn.
8 Fit a new tamperproof plug.
9 Adjust the throttle switch unit (Section 30).
10 Reconnect and adjust the accelerator cable.



44.4 Idle speed regulator on inlet manifold

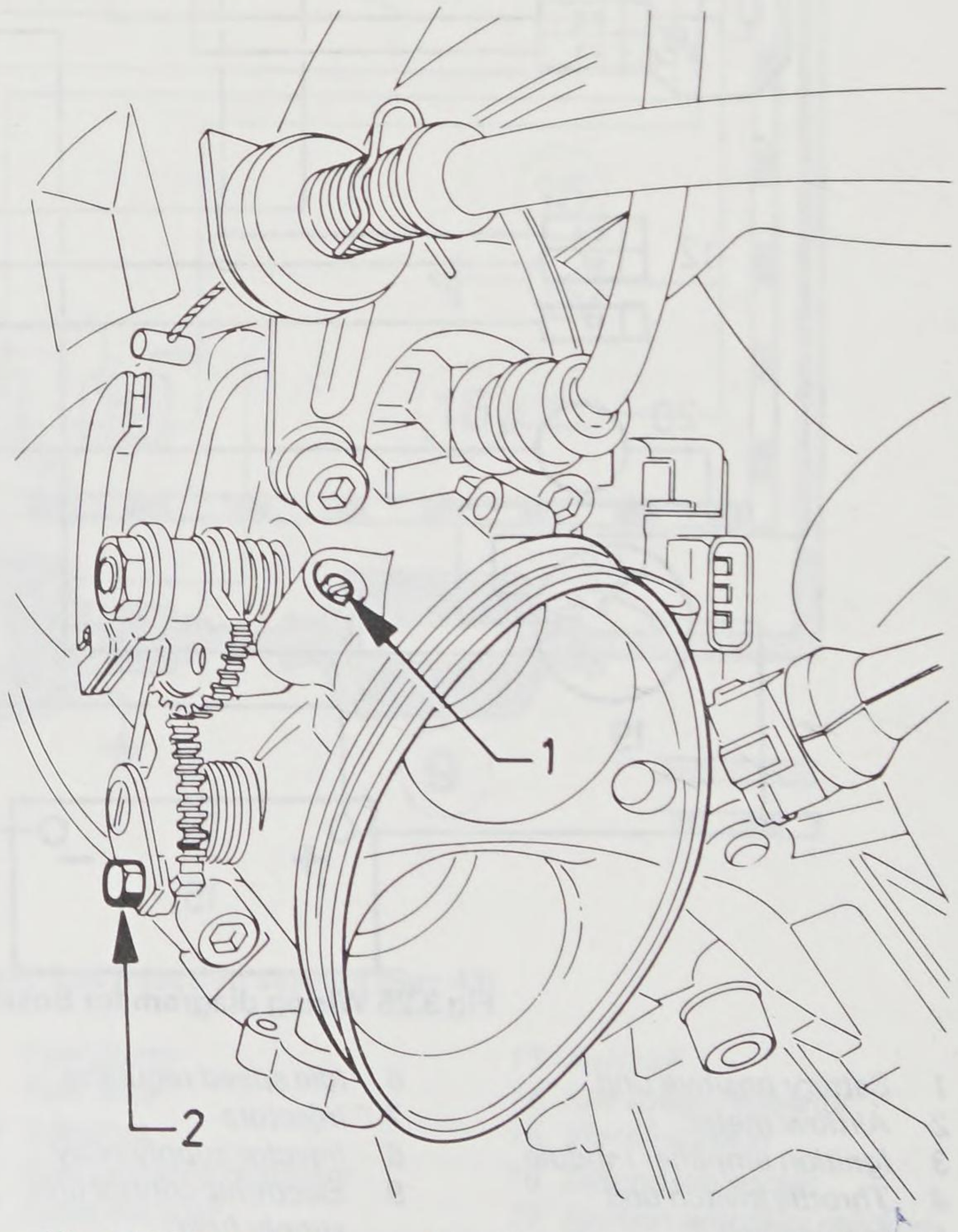


Fig 3.27 Throttle primary barrel adjustment screw (1) and synchronisation bolt (2) (Sec 45)

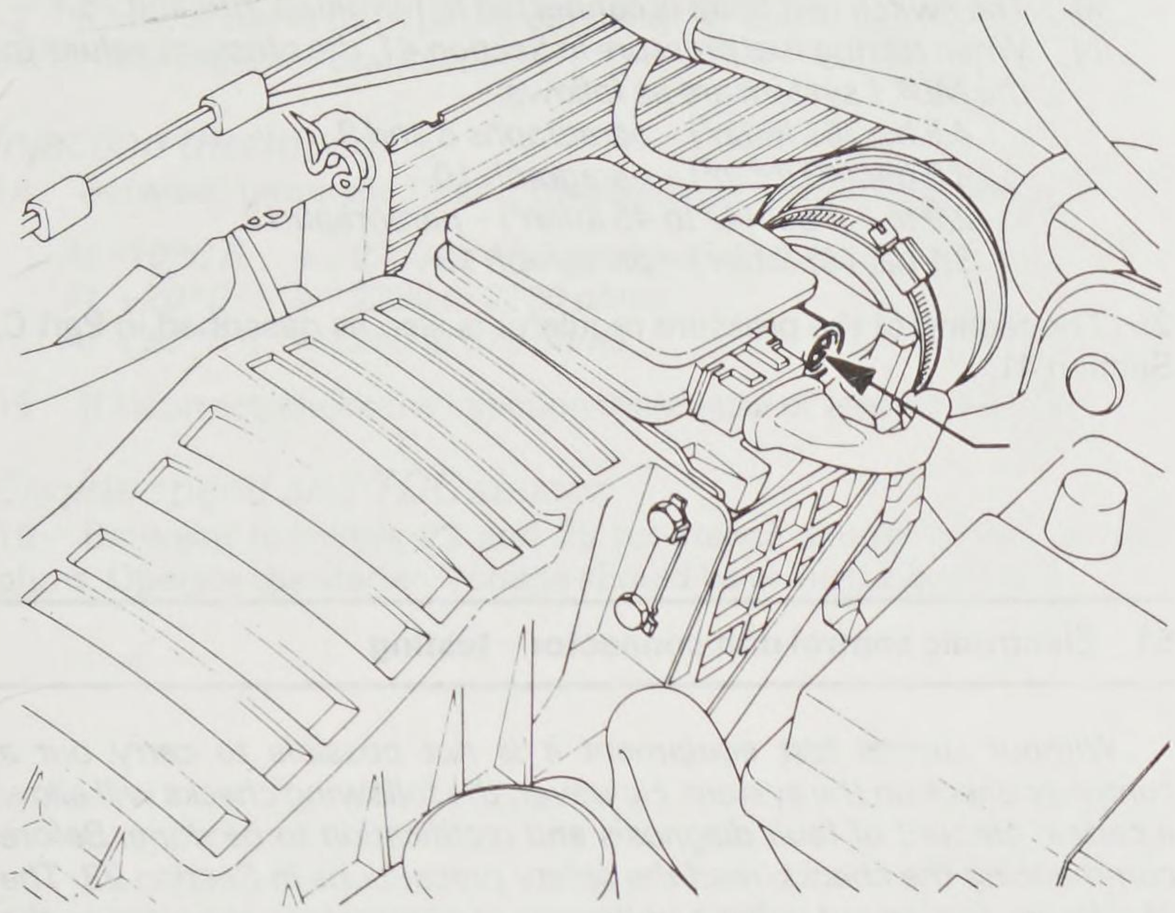


Fig 3.28 Mixture (CO) adjustment screw arrowed (Sec 46)

46 Idle speed and mixture (CO) – adjustment

1 The idle speed is non-adjustable. It is controlled by the idle speed regulator valve.
2 To check the mixture (CO), first ensure the conditions in Section 28, paragraph 1 are met.
3 Connect an exhaust gas analyser to the vehicle in accordance with the manufacturer's instructions.
4 Remove the tamperproof cap from the mixture adjustment screw on the airflow meter housing. Ensure that no exhaust emission control laws will be violated.
5 Turn the screw clockwise to increase and anti-clockwise to decrease CO content until the specified CO level is obtained.
6 Remove all test equipment and fit a new tamperproof plug to the screw.

47 Injectors and idle speed solenoid – testing

To test the injectors and the idle speed solenoid without resorting to specialist test equipment proceed as follows
1 Connect a test switch between terminal number 1 (wire 4A) on the diagnostic plug and earth.

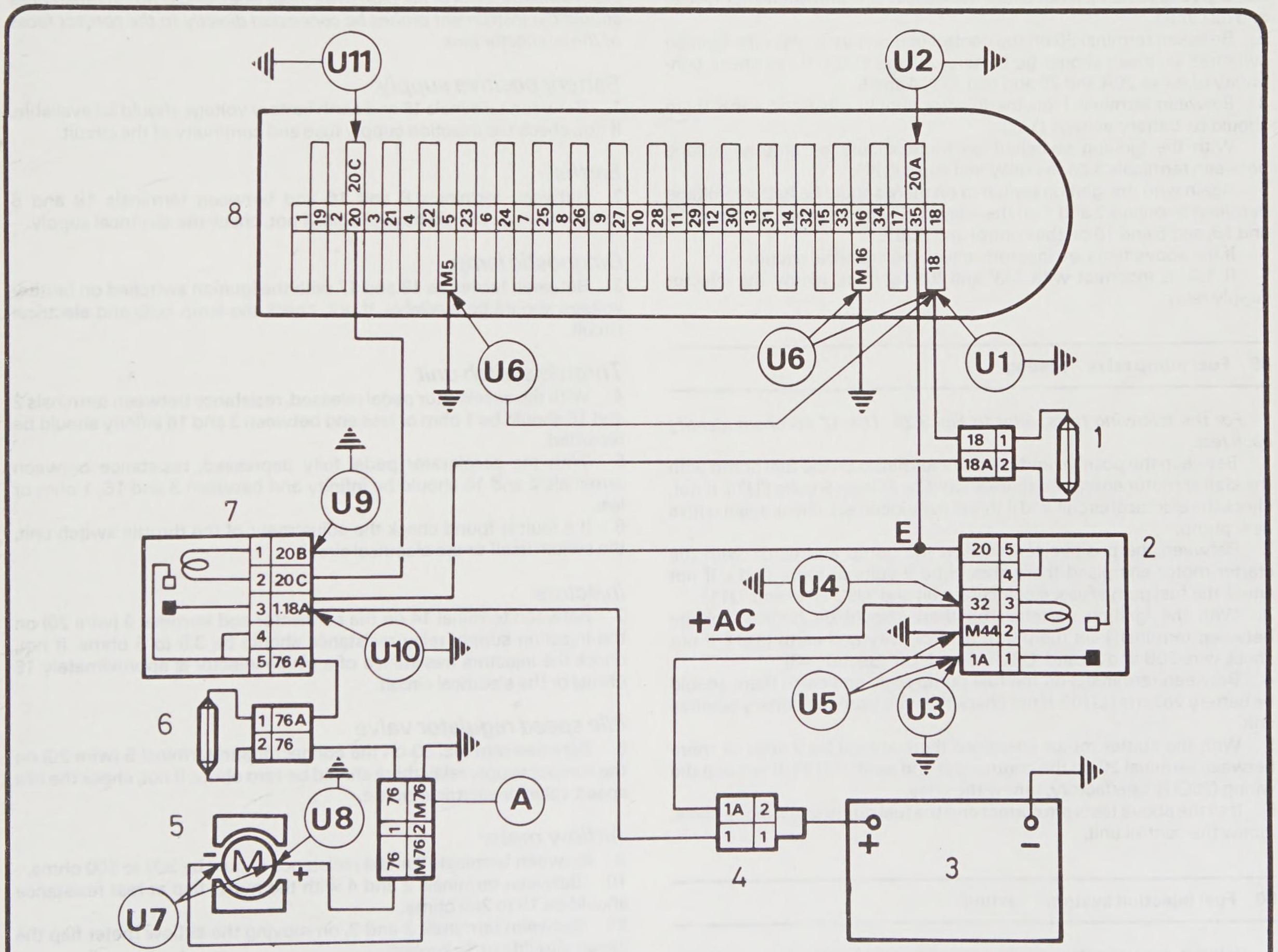


Fig 3.29 Wiring diagram for injector and fuel pump relay test (Secs 48 and 49)

1 Fuse (electronic control unit supply)
2 Injector supply relay
3 Battery
4 Battery positive unit
5 Fuel pump
6 Fuel pump fuse
7 Fuel pump control relay
8 Electronic control unit
U1 to U11 – voltage test values (see text)

2 Close the switch and turn on the ignition.
3 Wait about 3 seconds, then open the switch.
4 The lamp on the instrument panel should flash and after a few seconds the injectors should start to operate.
5 If one or more injectors does not operate, refer to checking of the control unit connector (Section 51).

Idle speed solenoid valve

6 Close the switch for approximately 3 seconds.
7 After a few seconds the solenoid valve should operate. If not check the solenoid valve by referring to checking of the control unit connector (Section 51).

48 Injector supply relay – testing

For the following tests refer to Fig. 3.29. The 'U' numbers identify each test. Voltage checks at the control unit must be done using a voltmeter connected to the wiring plug terminals indicated. To do this, remove the protective cover from the plug for access and insert the instrument probes into the back of the plug (wire input side). Under no circumstances should the voltmeter probes be connected directly to the contact faces of the connector pins.

1 Between terminal 18 on the control unit and earth there should be battery voltage ('U1'). If not check the electronic control unit supply fuse and its circuit.
2 Between terminal 35 on the control unit and earth with the ignition switched on there should be battery voltage ('U2'). If not check continuity of wires 20A and 20 and test 'U3', 4 and 5.
3 Between terminal 1 on the injector supply relay and earth there should be battery voltage ('U3').
4 With the ignition switched on there should be battery voltage between terminals 3 on the relay and earth ('U4').
5 Again with the ignition switched on there should be battery voltage between terminals 2 and 1 on the relay ('U5') and between terminals 16 and 18, and 5 and 18 on the control unit ('U6').
6 If the above tests are incorrect check the electrical circuit.
7 If 'U2' is incorrect with 'U3' and 'U4' correct, renew the injector supply relay.

49 Fuel pump relay – testing

For the following tests, refer to Fig. 3.29. The 'U' numbers identify each test.

1 Between the positive and negative terminals on the fuel pump with the starter motor energised there should be at least 9 volts ('U7'). If not, check the electrical circuit and if this proves incorrect, check again with a new pump.
2 Between the positive terminal on the pump and earth, with the starter motor energised there should be 9 volts or more ('U8'). If not check the fuel pump fuse, electrical circuit and 'U9', 'U10' and 'U11'.
3 With the ignition switched on there should be battery voltage between terminal 1 on the pump control relay and earth ('U9'). If not check wire 20B and 20 and 'U3', 'U4' and 'U5' (Section 48).
4 Between terminal 3 on the fuel pump relay and earth there should be battery voltage ('U10'). If not check the wire from the battery positive unit.
5 With the starter motor energised there should be 9 volts or more between terminal 20 on the control unit and earth ('U11'). If not and the wiring (20C) is satisfactory, renew the relay.
6 If all the above tests are correct and the fuel pump is still inoperative, renew the control unit.

50 Fuel injection system – testing

Without specialist test equipment it is not possible to carry out a complete test on the fuel injection system. However, the following tests and checks will enable basic fault diagnosis and remedial action to be taken. Before carrying out the tests, refer to the precautions in Part C, Section 23.

1 The testing of the fuel pressure is basically as described for the L3.1 system in Part C, Section 41 but note the following:

(a) The switch test lamp is connected to terminals 20B and 76A
(b) When testing fuel pressure in Section 41, the pressure values for the ML4.1 system are as follows:
4.5 bar (65 lbf/in²) – paragraphs 8 and 9
3.0 bar (43 lbf/in²) – paragraph 10
2.9 to 3.1 bar (42 to 45 lbf/in²) – paragraph 12
3.1 bar (45 lbf/in²) – paragraph 13

2 The testing of the pressure regulator is also as described in Part C, Section 41.

51 Electronic control unit connector – testing

Without special test equipment it is not possible to carry out a complete check on the system. However, the following checks will allow a certain amount of fault diagnosis and rectification to be done. Before commencing the checks, read the safety precautions in Section 23. The checks are carried out using a voltmeter or ohmmeter connected to the wiring plug terminals indicated. To do this it will be necessary to remove the protective cover from the plug for access and insert the instrument probes into the back of the plug (wire input side). Under no circumstances should the instrument probes be connected directly to the contact faces of the connector pins.

Battery positive supply

1 Between terminals 18 and earth battery voltage should be available. If not, check the injection supply fuse and continuity of the circuit.

Earths

2 Between terminals 8 and 16 and between terminals 18 and 5 battery voltage should be available. If not, check the electrical supply.

Diagnostic lamp

3 Between terminals 18 and 17 with the ignition switched on battery voltage should be available. If not, check the lamp bulb and electrical circuit.

Throttle switch unit

4 With the accelerator pedal released, resistance between terminals 2 and 16 should be 1 ohm or less and between 3 and 16 infinity should be recorded.
5 With the accelerator pedal fully depressed, resistance between terminals 2 and 16 should be infinity and between 3 and 16, 1 ohm or less.
6 If a fault is found check the adjustment of the throttle switch unit, the switch itself or the electrical circuit.

Injectors

7 Between terminal 14 on the connector and terminal 5 (wire 20) on the injection supply relay resistance should be 3.5 to 5 ohms. If not, check the injectors (resistance of a single injector is approximately 16 ohms) or the electrical circuit.

Idle speed regulator valve

8 Between terminal 33 on the connector and terminal 5 (wire 20) on the injector supply relay there should be zero ohms. If not, check the idle speed valve or electrical circuit.

Airflow meter

9 Between terminals 3 and 4 resistance should be 300 to 500 ohms.
10 Between terminals 2 and 4 with the meter flap at rest resistance should be 10 to 200 ohms.
11 Between terminals 2 and 3, on moving the airflow meter flap the circuit should not be broken.

Intake air temperature thermistor

12 Between terminals 4 and 5 resistance should be as follows:

At –10°C R = 8260 to 10 560 ohms
At +20°C R = 2280 to 2720 ohms
At +50°C R = 760 to 910 ohms

13 If any of the tests in paragraphs 9 to 12 above are incorrect check the airflow meter or thermistor.

Injection thermistor

14 Between terminals 13 and 16 resistance should be as follows:

At -10°C R = 8200 to 11 000 ohms
At +20°C R = 2280 to 2720 ohms
At +80°C R = 290 to 370 ohms

15 If incorrect, check the injection thermistor or electrical circuit.

Engine speed and TDC sensor

16 Between terminals 23 and 25 resistance should be 490 to 600 ohms. Operate the starter. Voltage should be at least 2.5 volts.

17 If not, check the TDC sensor or electrical circuit.

Compressor signal

18 Between terminals 32 and 16 with the ignition switched on and the compressor working, voltage should be battery voltage. If not, check the electrical circuit.

52 Fault diagnosis - ML4.1 (Motronic) fuel injection models

Refer to Part C, Section 42.

Chapter 4 Ignition system

Contents

Coil – removal and refitting	7	General description	1
Distributor – dismantling and reassembly	5	Ignition timing – checking and adjustment	9
Distributor – removal and refitting	3	Routine maintenance	2
Distributor cap, rotor arm and HT leads – inspection	4	Spark plugs – removal and refitting	8
Fault diagnosis – ignition system	10	TDC sensor – removal and refitting	6

Specifications

System type

Carburettor and L3.1 Jetronic fuel injection models	Electronic, breakerless
Mi 16 models	Motronic fully electronic fuel/ignition engine management system

Distributor

Rotor rotation	Anti-clockwise
Firing order	1 – 3 – 4 – 2 (No 1 cylinder at flywheel end)

Ignition timing (vacuum pipe disconnected and plugged)

Leaded fuel (97 RON):	
Carburettor models	10° BTDC at 750 rpm
L3.1 Jetronic fuel injection models	5° BTDC at 900 rpm
Mi 16 models	Computer controlled (non-adjustable)
Unleaded fuel (95 RON):	
Carburettor models:	
Engine code XU52C B2A	10° BTDC at 750 rpm
Engine code XU92C D2D	Retard ignition by 3°
L3.1 Jetronic fuel injection models	Retard ignition by 3°

Unleaded petrol not suitable for Mi 16 (Motronic engine management system)

Spark plugs

Type (all models)	Champion C7YC, C7YCC, C7YCX
Electrode gap	0.8 mm (0.031 in)

HT leads

Type	No information at time of writing

Ignition coil

Primary resistance	0.7 ohms
Secondary resistance	66 000 ohms

Torque wrench setting

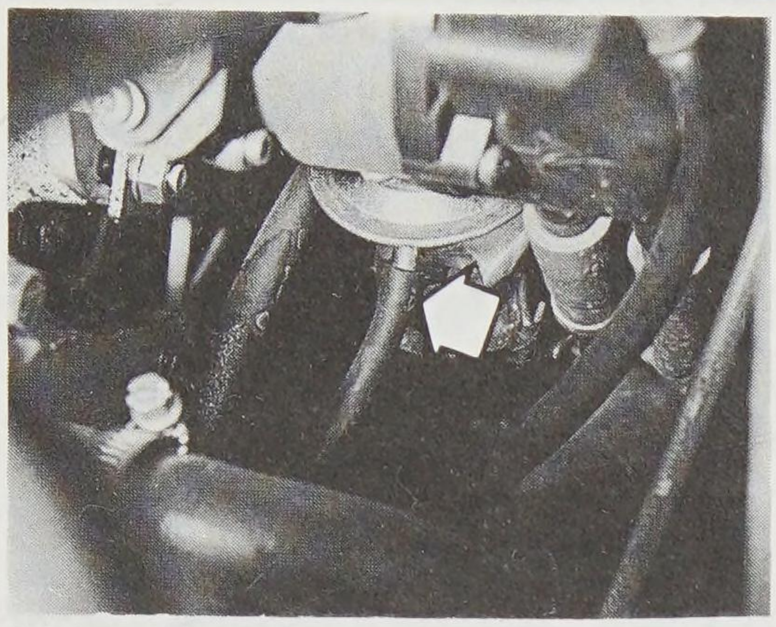
	Nm	lbf ft
Spark plugs	27	20

1 General description

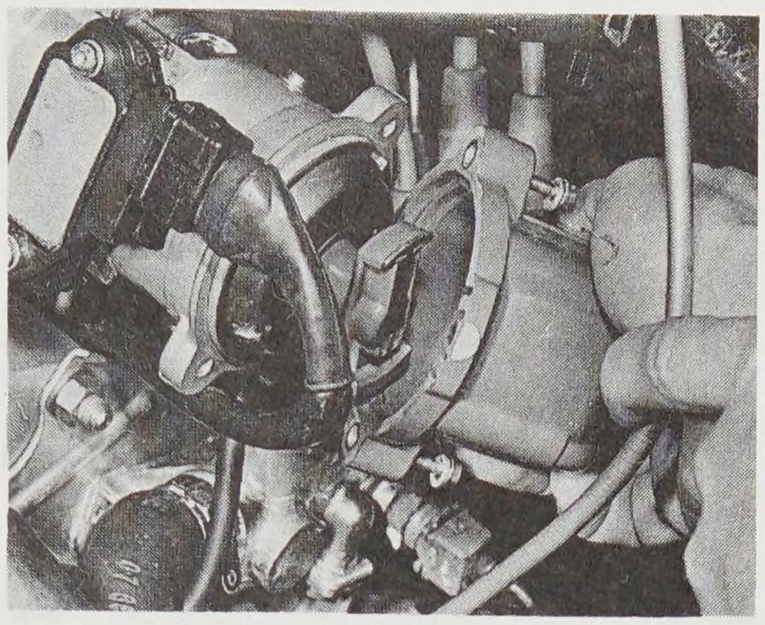
On carburettor models and those fuel injection models fitted with the Bosch L3.1 Jetronic system, the ignition system is of electronic breakerless type. The distributor is mounted on the end of the cylinder head and driven from the camshaft. The system incorporates an ignition module mounted on the side of the distributor or externally on the coil bracket. The coil is bolted to a bracket on the side of the cylinder block above the starter motor on carburettor models, and to the inlet manifold on fuel injection versions. The spark plugs are flat seated.

On Mi 16 models, the ignition system is part of the Motronic fuel/ignition management system, the function of the distributor being taken over by the Electronic Control unit and ignition module. However, a distributor cap and rotor arm assembly is still fitted to the cylinder head in order to distribute the spark to the cylinders. Reference should also be made to Chapter 3 for more details.

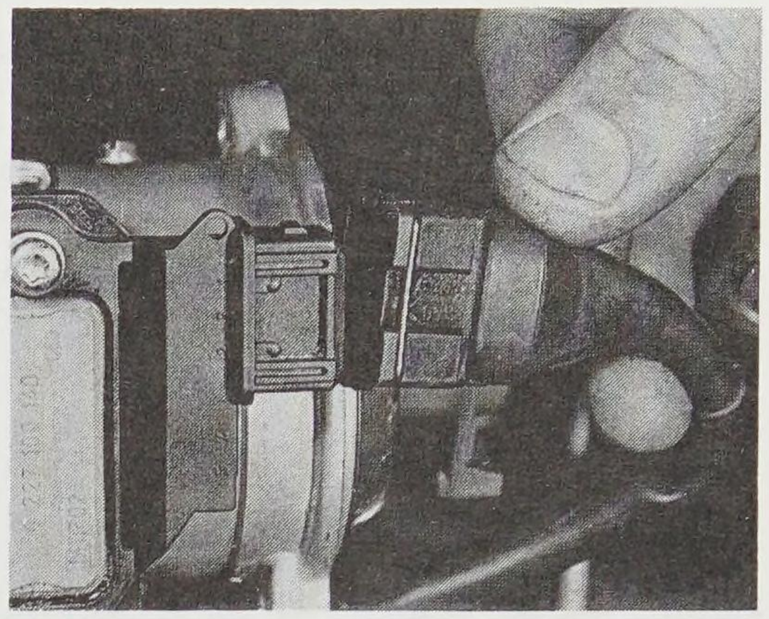
In order that the engine may run correctly it is necessary for an



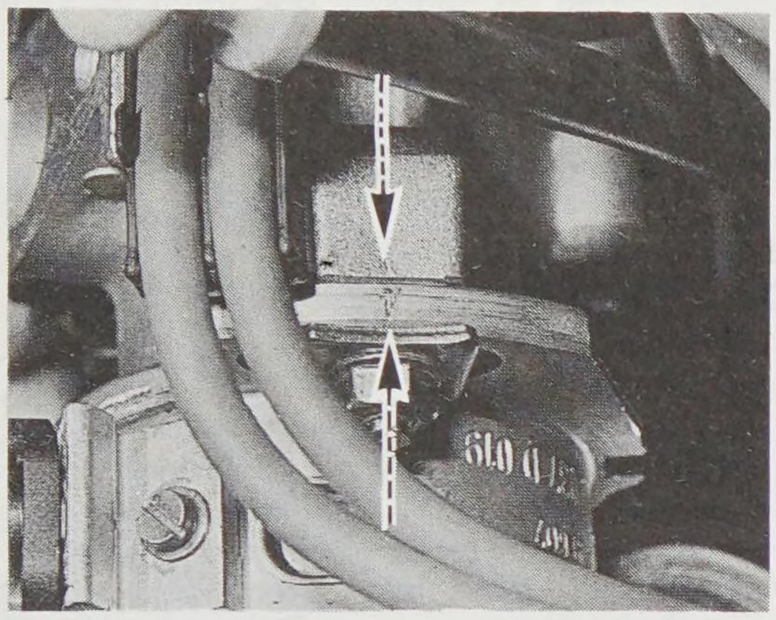
3.3 Distributor vacuum pipe connection (arrowed)



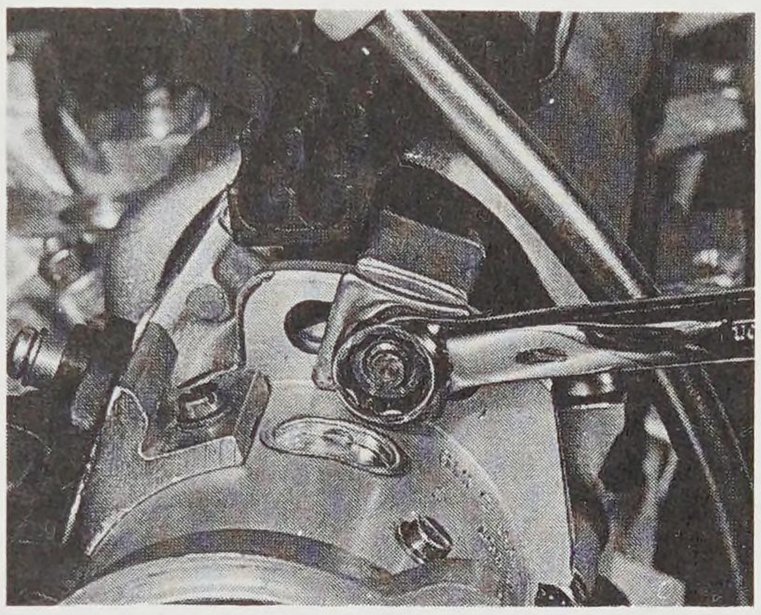
3.4 Removing the distributor cap



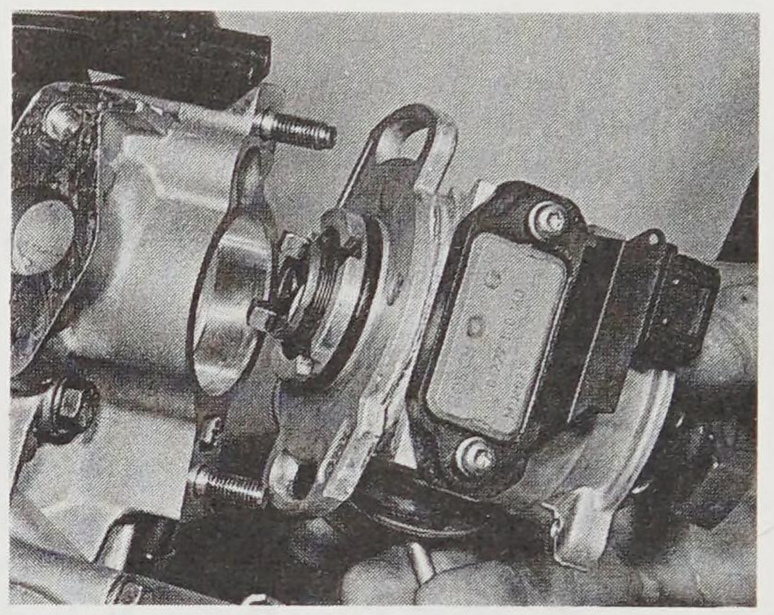
3.5 Disconnecting the ignition module multi-plug



3.6 Alignment marks across the distributor and cylinder head housing



3.7 Undoing the distributor clamp nut



3.8 Withdrawing the distributor

electrical spark to ignite the fuel/air mixture in the combustion chamber at exactly the right moment in relation to engine speed and load.

Basically the ignition system functions as follows. Low tension voltage from the battery is fed to the ignition coil, where it is converted into high tension voltage. The high tension voltage is powerful enough to jump the spark plug gap in the cylinder many times a second under high compression pressure, providing that the ignition system is in good working order.

The ignition system consists of two individual circuits known as the low tension (LT) circuit and high tension (HT) circuit.

The low tension circuit (sometimes known as the primary circuit) comprises the ignition switch, primary ignition coil windings, and ignition module. The high tension circuit (sometimes known as the secondary circuit) comprises the secondary ignition coil windings, distributor cap, rotor arm, spark plugs and HT leads.

The primary circuit is initially switched on by the ignition module and a magnetic field is formed within the ignition coil. At the precise point of ignition the pulse generator causes the ignition module to switch off the primary circuit, and high tension voltage is then induced in the secondary circuit and fed to the spark plug via the distributor cap and rotor arm.

Warning: *The voltages produced by the electronic ignition system are considerably higher than those produced by the conventional system. Extreme care must be used when working on the system with the ignition switched on, particularly by persons fitted with a cardiac pacemaker.*

2 Routine maintenance

At the intervals laid down in the Routine maintenance *Section at the beginning of this manual, carry out the following operations.*

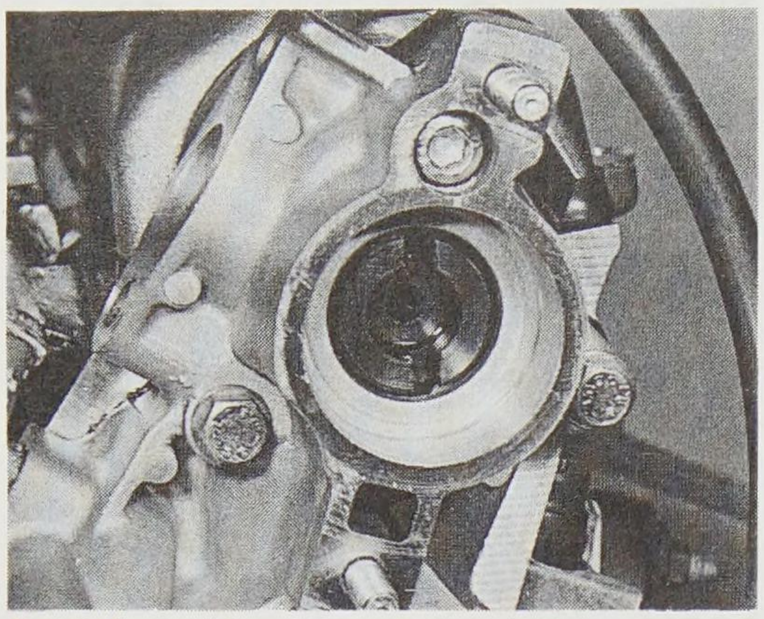
1 Renew the spark plugs (Section 8).
2 Check and adjust as necessary the ignition timing (Section 9).
3 Periodically, particularly during winter, check the ignition system for security of components and tightness of all connections.

3 Distributor – removal and refitting

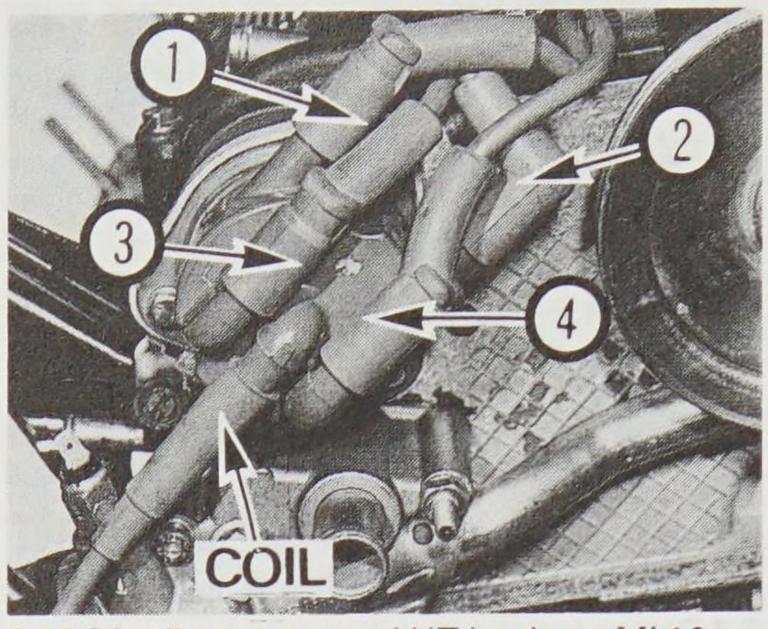
Note: *There is no distributor on Mi 16 models, however there is still a distributor cap and rotor fitted to the end of the inlet valve camshaft. Note also that the ignition module is mounted on a bracket by the battery tray on the Mi 16.*

All models except Mi 16

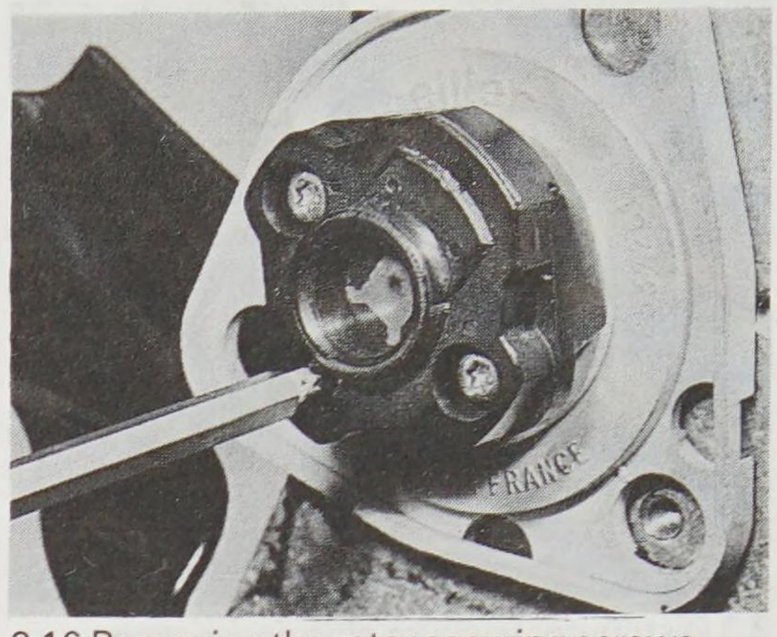
1 On carburettor models, disconnect and remove the hot air intake duct for more access.
2 Mark the HT leads 1 to 4 before disconnecting them from the spark plugs so they can be refitted to the correct plug. This is easily done with a felt tip pen if a label is not already present.
3 Disconnect the vacuum advance pipe from the distributor (photo).
4 Remove the distributor cap securing screws and withdraw the distributor cap and HT leads, unclipping the leads from the camshaft cover (photo).
5 Disconnect the multi-plug from the ignition module on the side of the distributor (photo).
6 Make alignment marks across the distributor body and the cylinder head housing if none are present (photo).
7 Undo the distributor clamp nut (photo).
8 Withdraw the distributor (photo).
9 Refit in reverse order, noting that the drive slots in the camshaft and dogs on the distributor are off-set (photo). The rotor arm must be turned to line them up.
10 Line up the previously made marks on the distributor and cylinder head housing and tighten the distributor clamp bolt. In this position, the rotor arm should be facing the number one cylinder HT lead segment in the distributor cap when the timing marks on the flywheel and timing plate are lined up, remembering that number one cylinder is nearest the flywheel end.
11 If a new distributor is being fitted and there are no alignment marks, set the distributor to the mid-way position in the elongated hole.
12 Check and adjust ignition timing as described in Section 9.



3.9 Off-set drive slots on camshaft



3.15 Distributor cap and HT leads on Mi 16 models



3.16 Removing the rotor securing screws

Mi 16 models

13 Remove the cover plate from between the camshaft cover.
14 Disconnect the HT leads from the spark plugs.
15 Remove the bolts securing the distributor cap and lift off the cap complete with HT leads (photo).

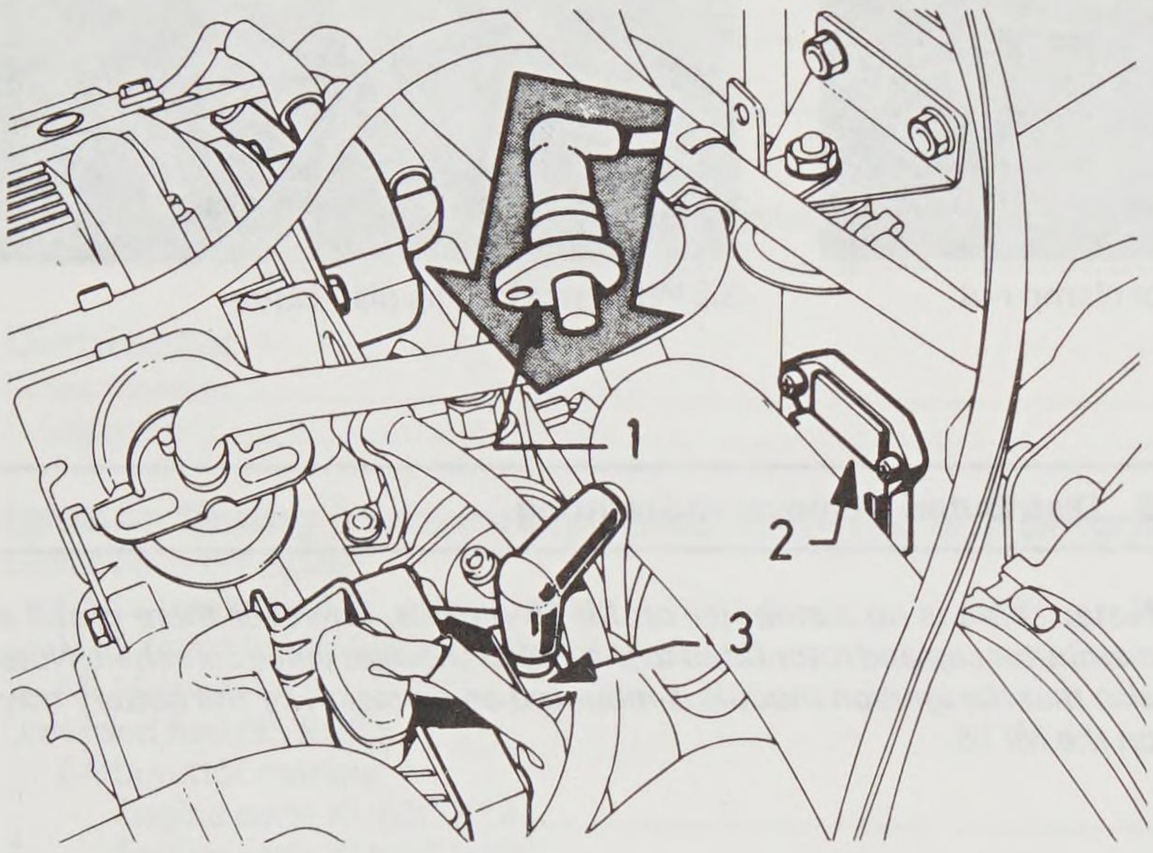
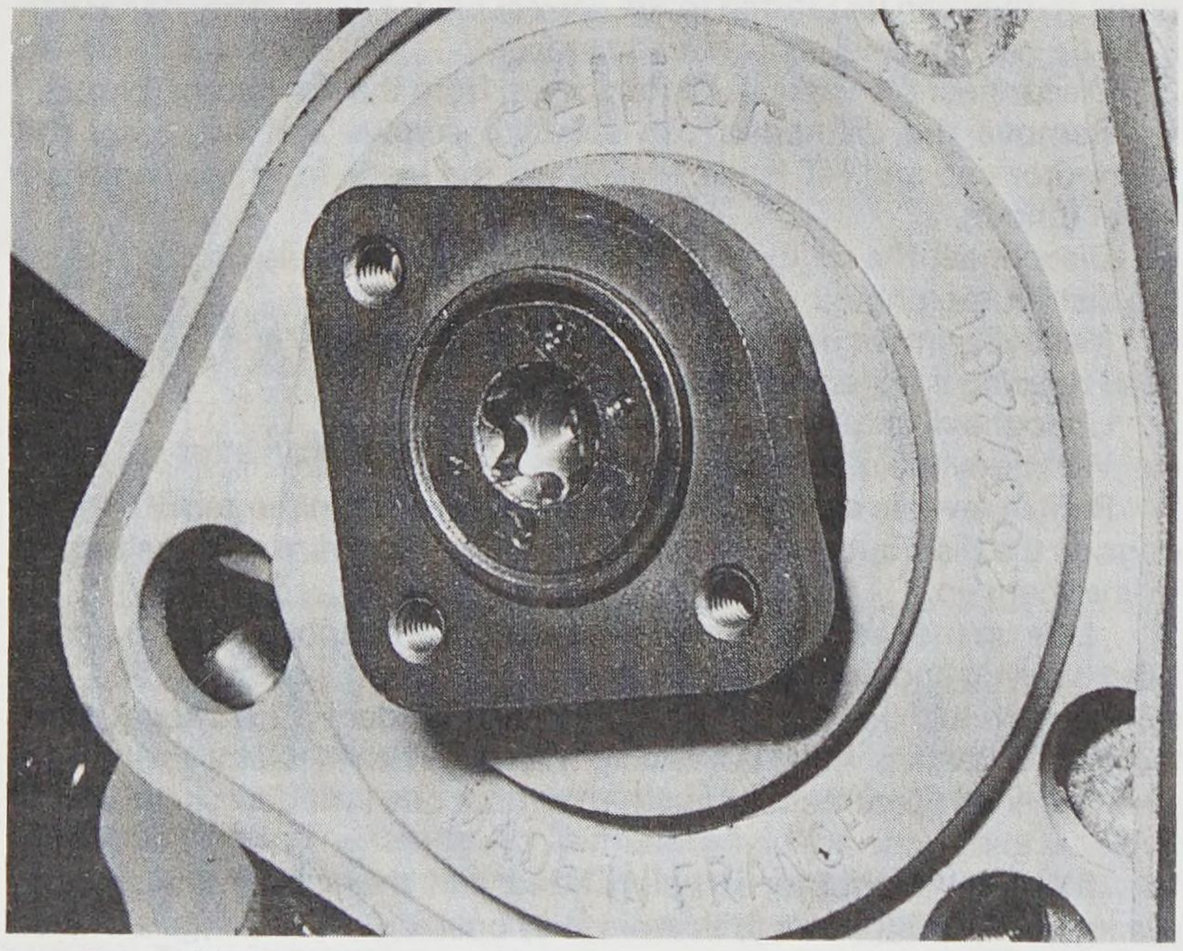


Fig 4.1 Motronic ML4.1 TDC sensor (1) ignition module (2) and coil (3) locations (Sec 3)

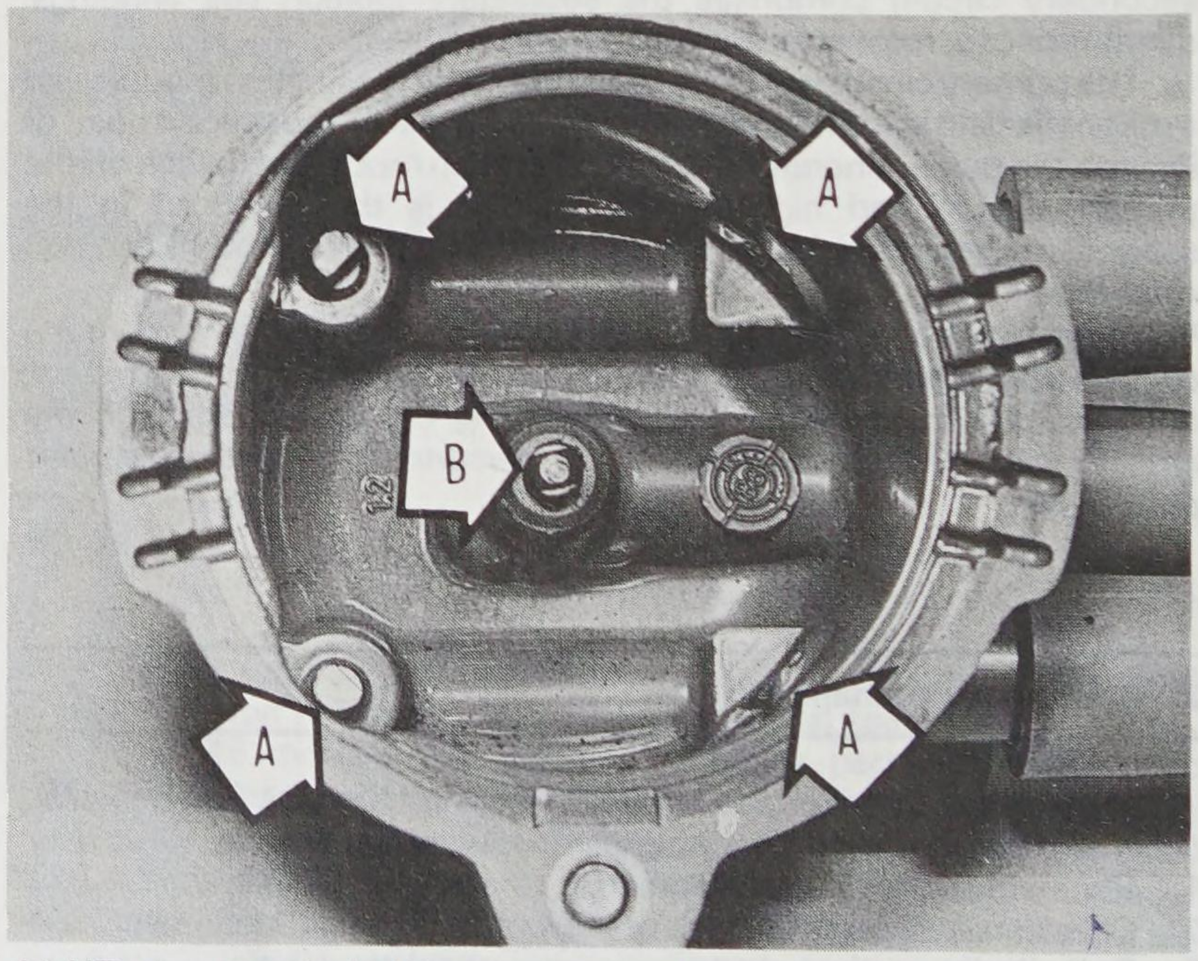


3.17 Rotor drive flange

16 Undo the three Torx headed screws securing the rotor to the rotor drive flange and lift off the rotor (photo).
17 Remove the screw from the centre of the drive flange and withdraw the flange (photo).
18 Remove the plastic base plate.
19 Refit in reverse order, using thread-locking compound on the threads of the drive flange screw.

4 Distributor cap, rotor arm and HT leads – inspection

1 After removing the distributor cap as described in Section 3, inspect the terminals on the inside of the cap for pitting and corrosion. Light erosion can be removed using a small file, but if they are heavily corroded or pitted the cap must be renewed (photo).
2 Inspect the inside of the cap carefully for thin lines running between the electrodes and the centre carbon brush, indicating tracking. This is a result of the HT current 'leaking' across the terminals. Renew the cap if this is evident. A good way of checking for tracking and/or arcing in the ignition system is to view the system with the engine running in the dark. Any faults will readily be seen.
3 Check the carbon brush in the centre of the cap for wear and that it is free to move on its spring base. Again renew the cap if necessary.
4 Inspect the outer HT terminals for cleanliness and corrosion and that the HT cable terminals are a tight fit.
5 Spray the inside and outside of the cap lightly with water repellant fluid. Refitting the cap is a reversal of removal.



4.1 HT outer terminals (A) and centre carbon brush (B) on distributor cap

Rotor arm

6 Check the tip of the rotor arm for wear and erosion. Clean the tip using a fine file or emery cloth.
7 Also clean the centre of the arm where the carbon brush of the distributor cap contacts it.
8 If the rotor is cracked it must be renewed.

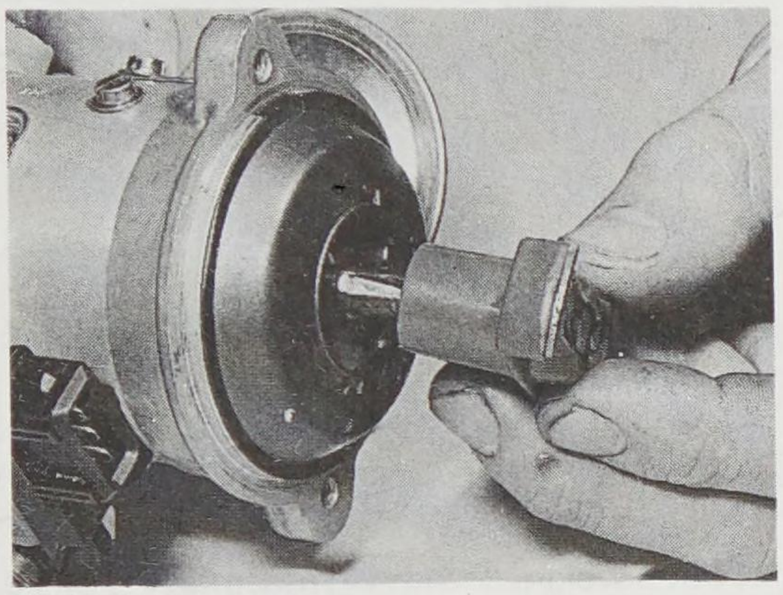
HT leads

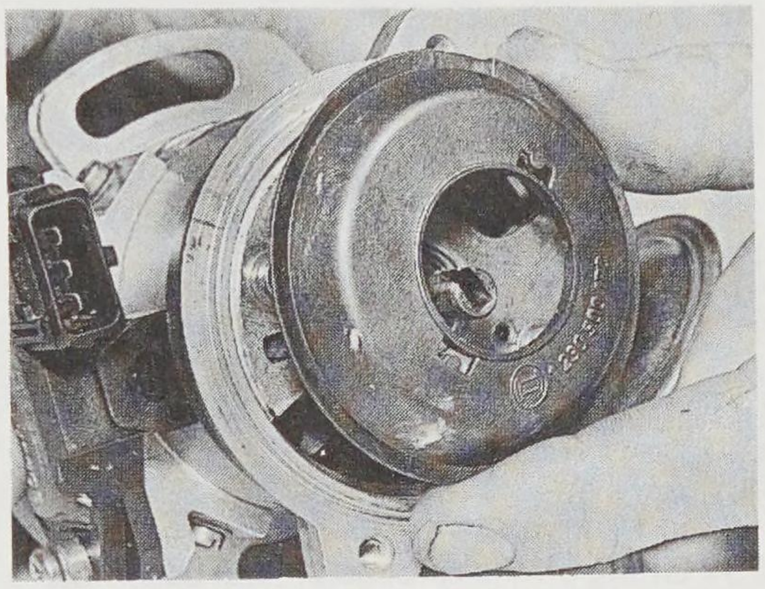
9 Keep the leads clean and dry. Check that their end connections at the spark plugs, distributor cap and coil are a tight fit.

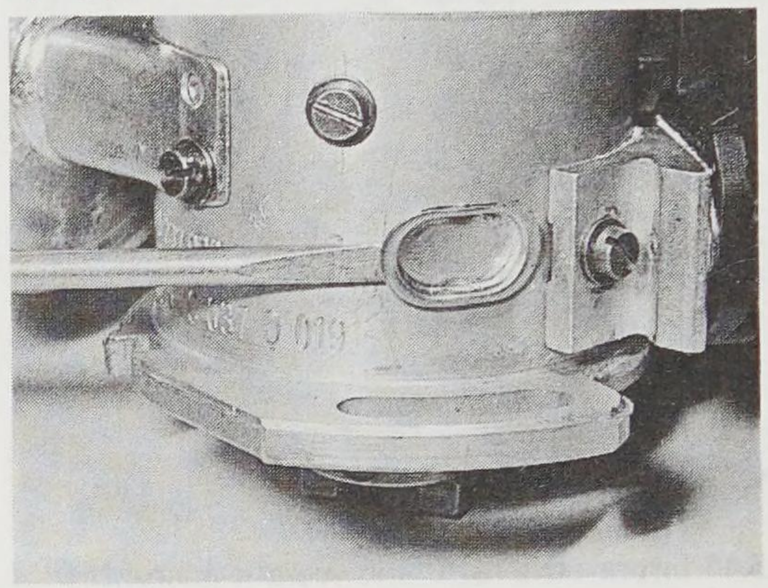
5 Distributor – dismantling and reassembly

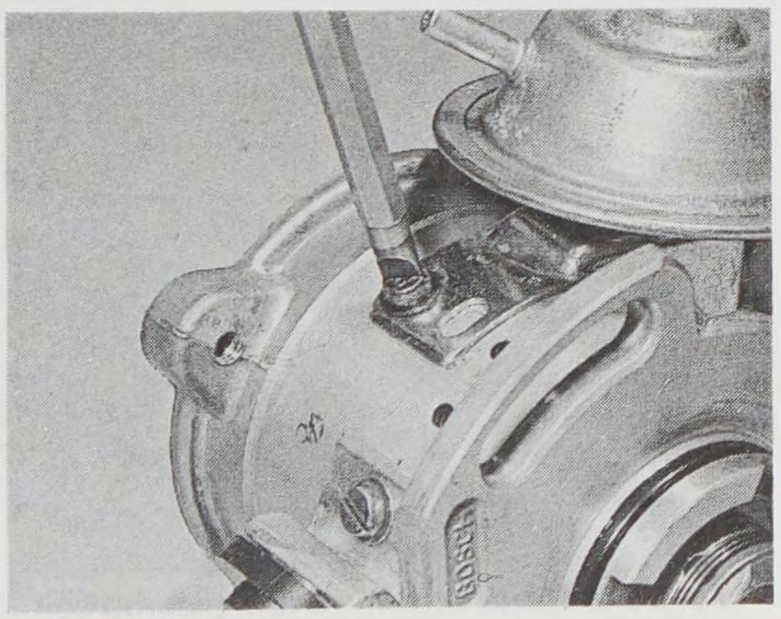
Note: *This procedure is specific to the Bosch distributor. A Ducellier type may be fitted and although no details were available at the time of writing, the procedure would be similar.*

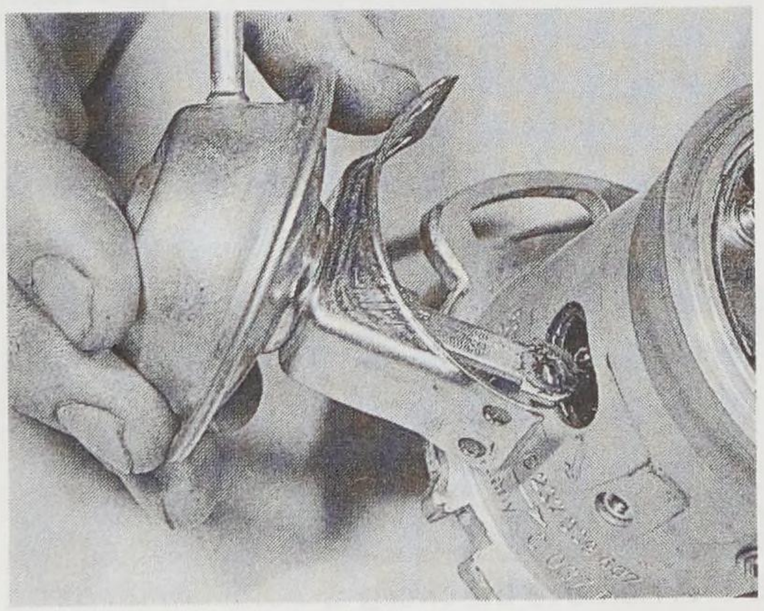
1 Remove the distributor as described in Section 3.
2 Pull off the rotor arm and lift off the plastic shield (photos).
3 Prise out the inspection cover (photo).
4 Remove the screws and lift off the vacuum unit, unhooking it from the post on the baseplate which can be seen through the inspection hole (photos).
5 Where fitted, unscrew and remove the ignition module from the side of the distributor (photos).
6 Similarly remove the electrical connector. A Torx screwdriver is required (photos).
7 Remove the screws and lift off the bearing plate (photo).
8 Extract the large circlip (photo).
9 Tap out the locking pin from the drive dog using a pin punch and remove the dog, spring and washers.
10 Extract the rotor circlip using circlip pliers (photo).
11 Lift out the rotor and weight assembly with the shaft (photo).
12 Unhook the bob weight springs from the posts on the stator plate and lift off the rotor and stator assembly (photo).
13 Note that the bob weight springs are different, so mark one spring and its post with a quick drying paint (typewriter correction fluid is ideal)

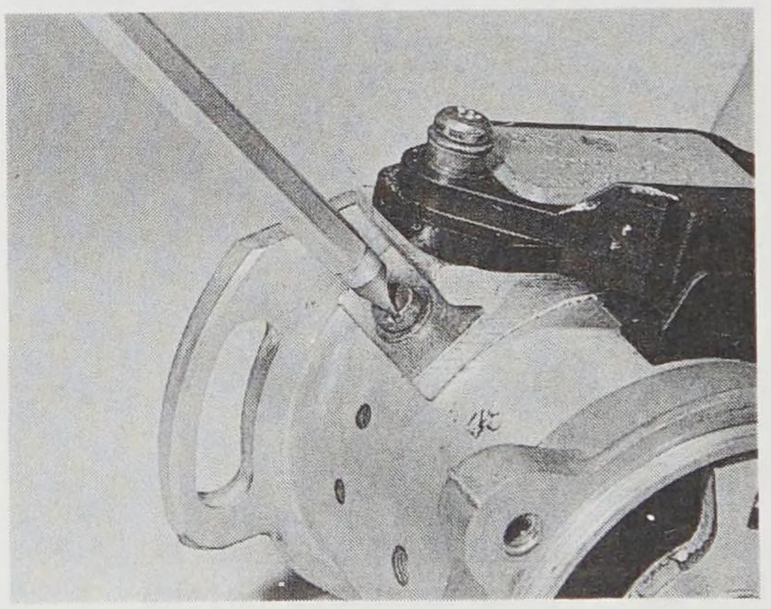

5.2A Pull off the rotor arm ...

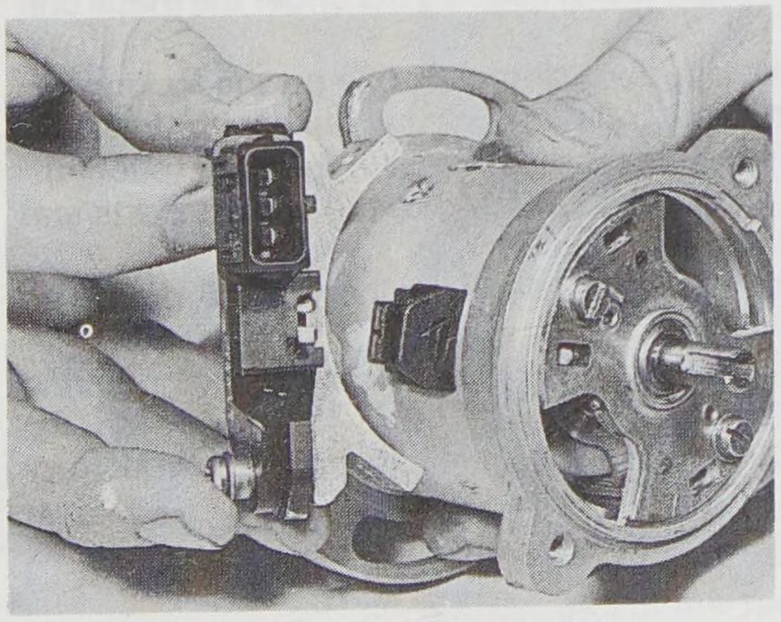

5.2B ... and lift off the plastic shield

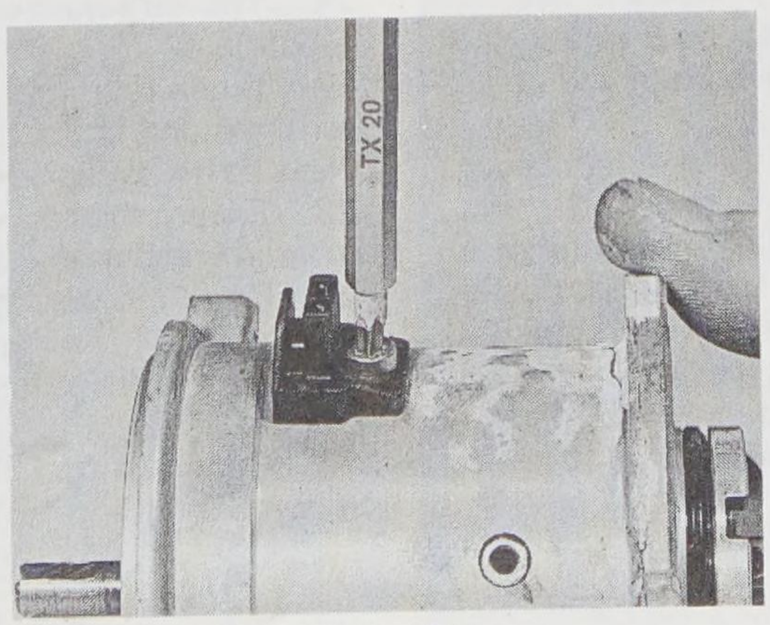

5.3 Prise out the inspection cover


5.4A Remove the screws ...

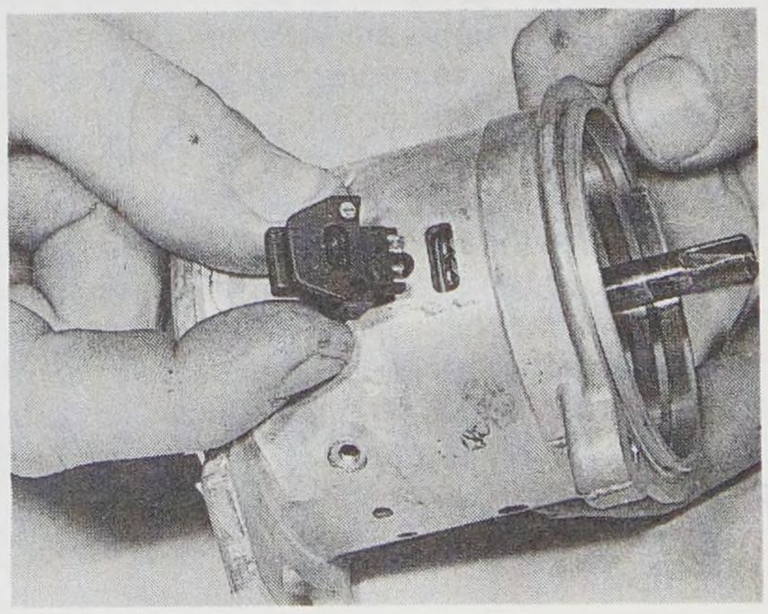

5.4B ... and lift off the vacuum unit

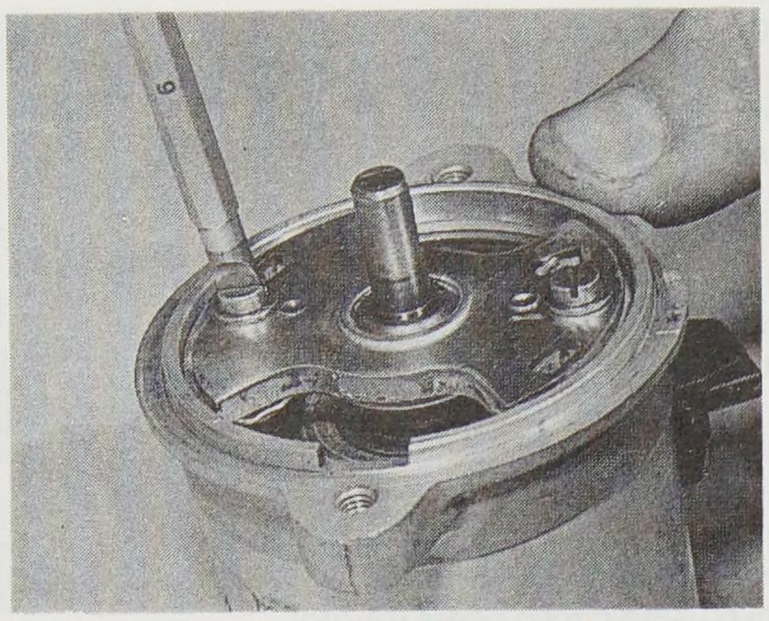

5.5A Remove the screws ...


5.5B ... and lift off the ignition module

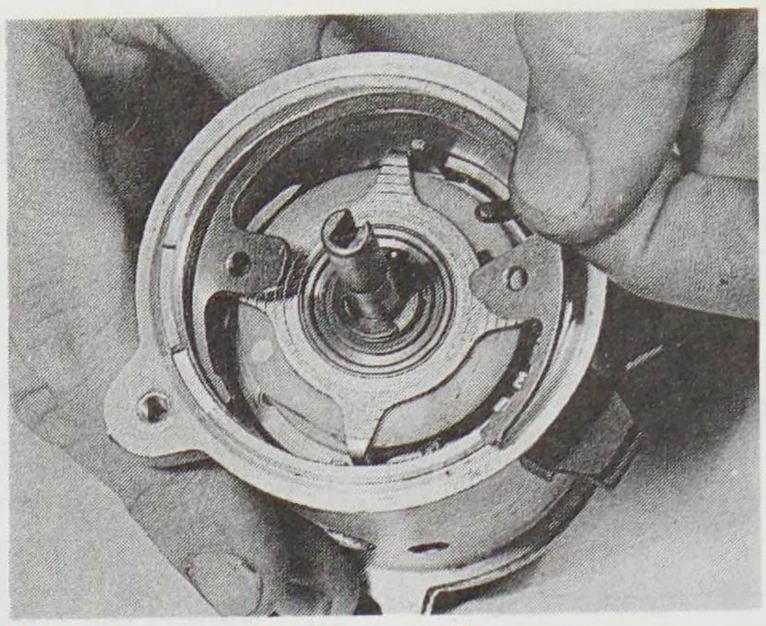


5.6A Using a Torx screwdriver ...

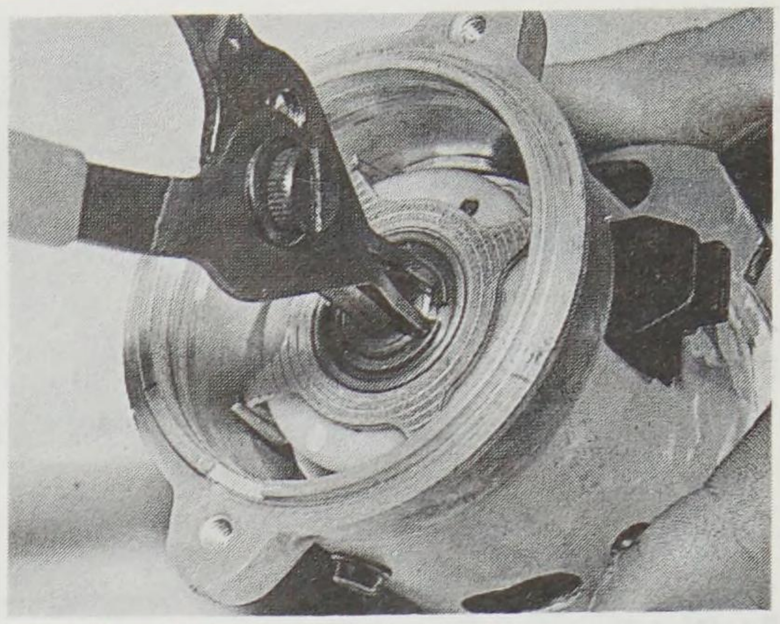

5.6B ... to remove the connector



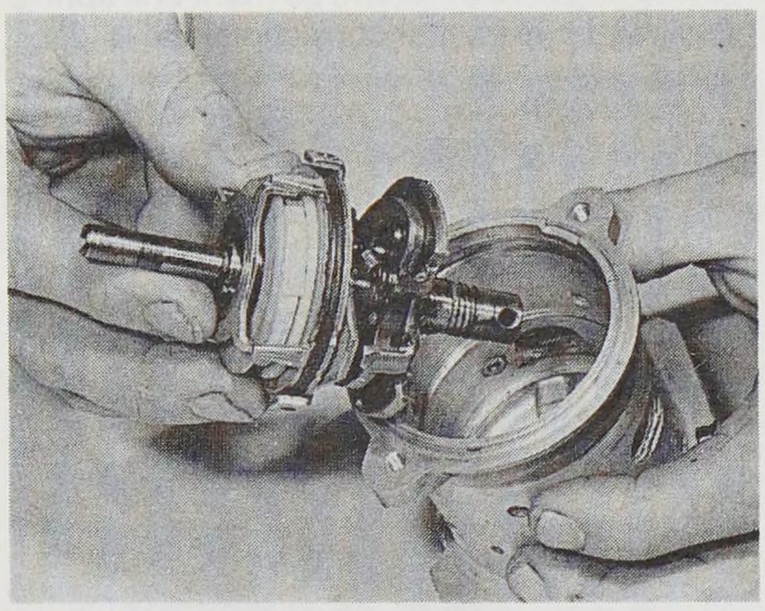
5.7 Removing the screws from the bearing plate



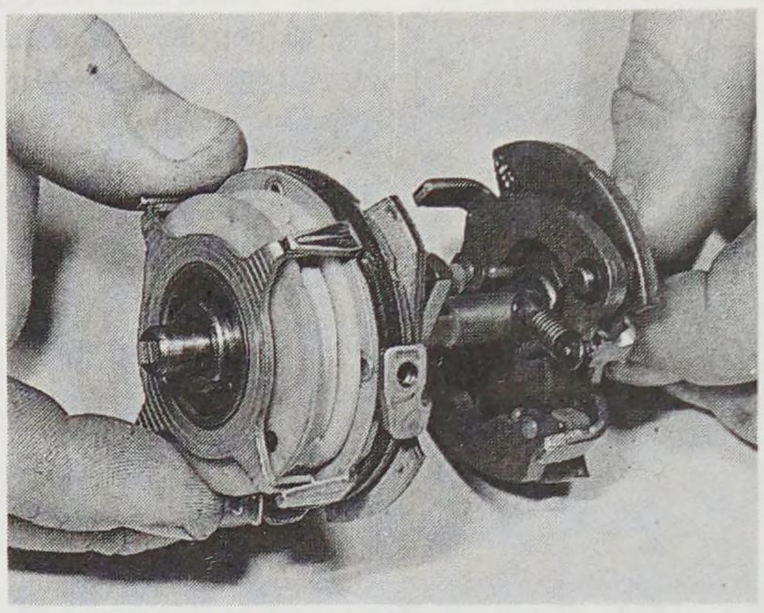
5.8 Extracting the large circlip



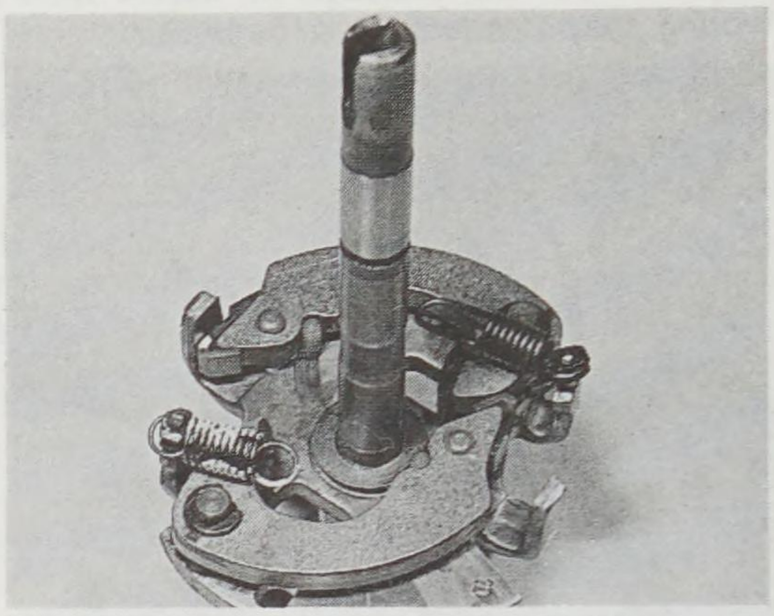
5.10 Extracting the rotor circlip



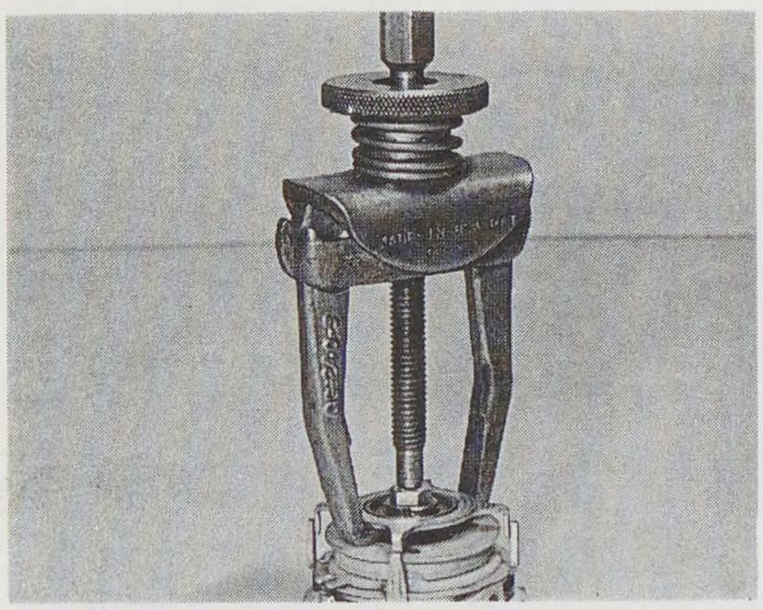
5.11 Lift out the rotor and weight-assembly with the shaft



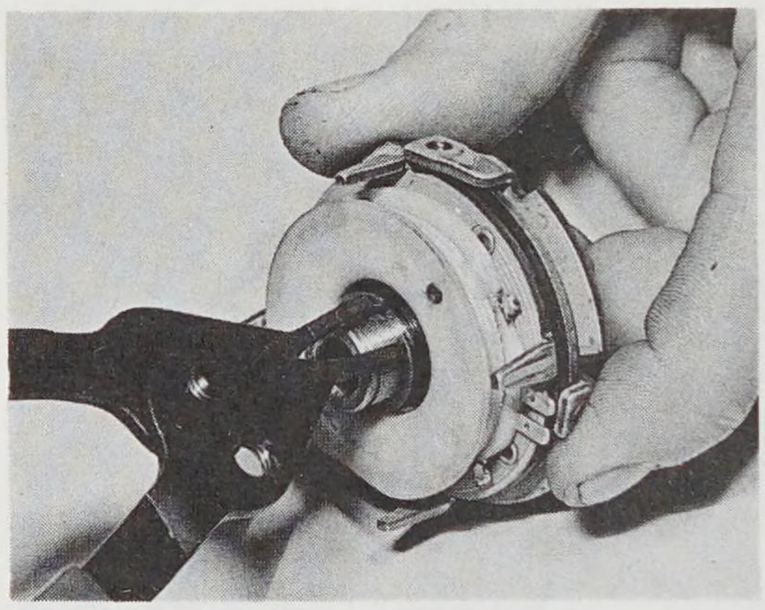
5.12 Lifting off the rotor and stator assembly



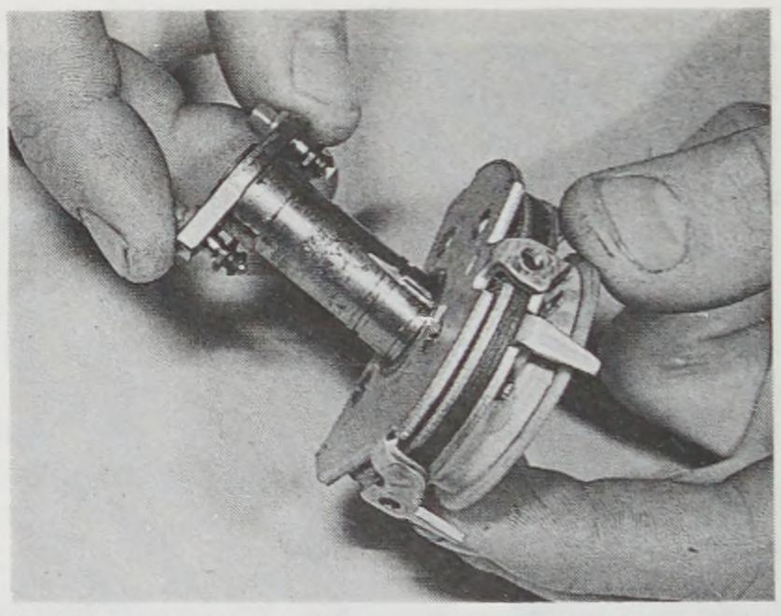
5.14 Bob weight and spring assembly



5.16 Using a puller to remove the rotor



5.17A Remove the circlip ...



5.17B ... and lift off the stator and pick-up coil

so that the springs are refitted in the same position.

14 The bob weights are secured to their pivot posts by circlips. Check that they are free to move, and if necessary, remove them and grease the posts before refitting (photo).

15 The bob weight springs tend to stretch and lose their effectiveness after a high mileage, therefore it is beneficial to renew them.

16 Remove the rotor from the stator. If it is tight use a puller (photo).

17 Remove the circlip and lift off the stator and pick-up coil (photos).

18 The stator coil is secured to the baseplate by screws (photo).

19 Clean and inspect all parts for wear, renewing them as necessary, and any other parts the fault diagnosis has proved defective.

20 Reassembly is a reversal of removal, taking note of the following points.

21 The fibre washer in the distributor housing fits under the metal one (photo).

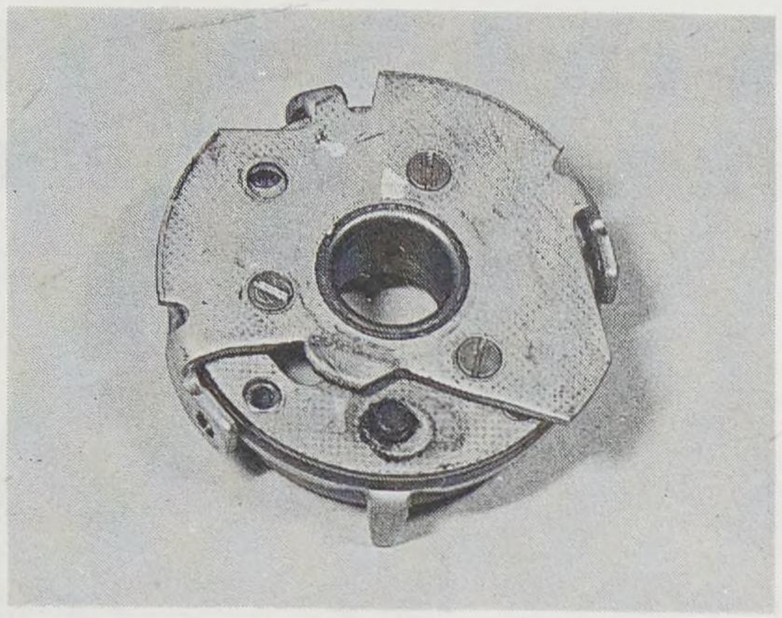
22 When refitting the rotor to the stator coil, line up the locking pin recesses and fit the pin, tapping it down until it is flush with the rotor. Next, fit the circlip, ensuring it engages in the slot in the shaft (photos).

23 Ensure the bob weight springs are fitted to the correct posts and located in the grooves (photo).

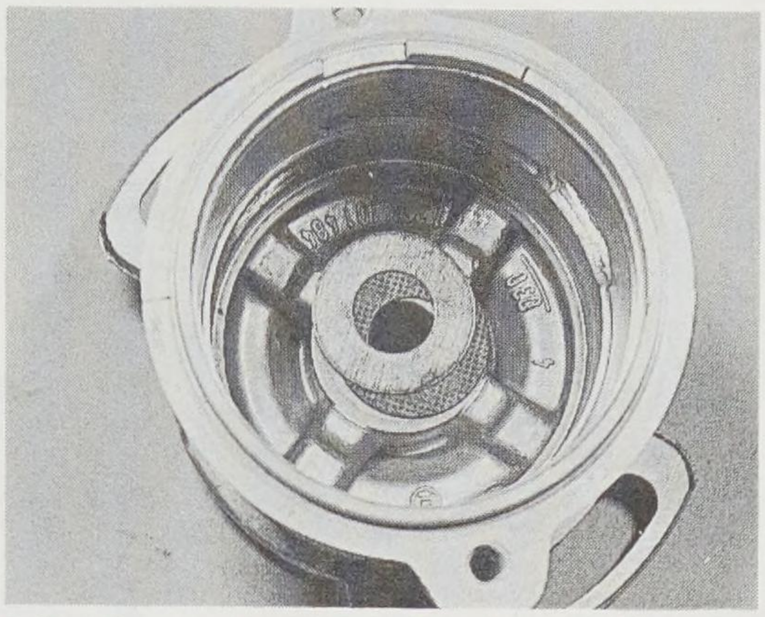
24 The fibre washer fits under the metal washer on the drive end (photo).

25 Fit the drive dog, knock in a new pin and fit the retaining spring (photos).

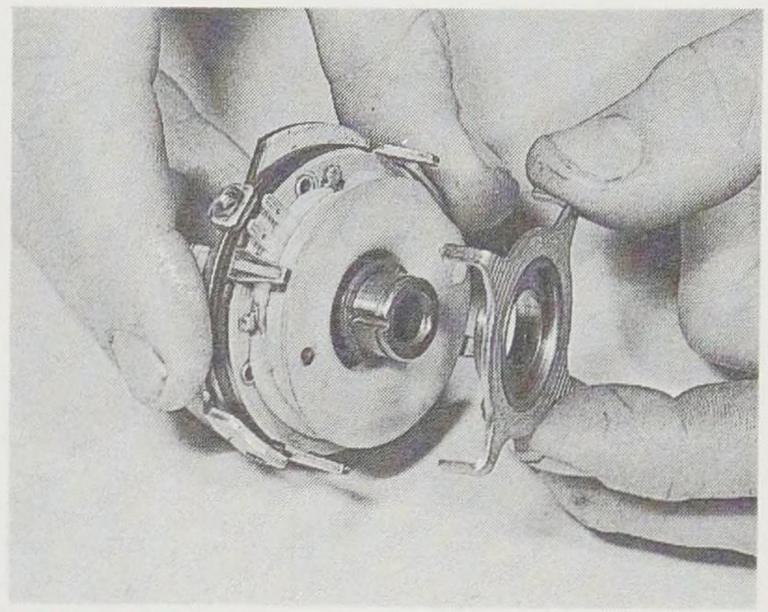
26 Do not forget the circlip which secures the pick-up and rotor (photo).



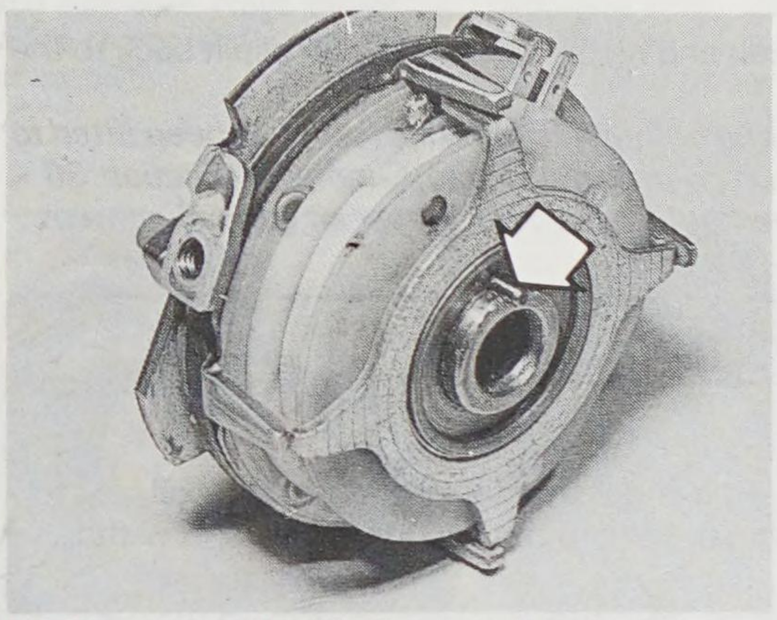
5.18 The stator is secured to the baseplate by screws



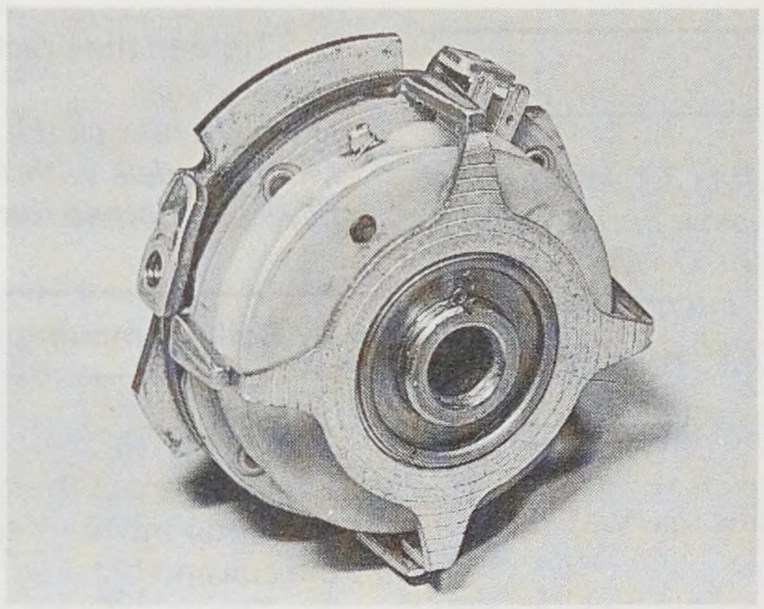
5.21 Fibre washer fits under the metal washer



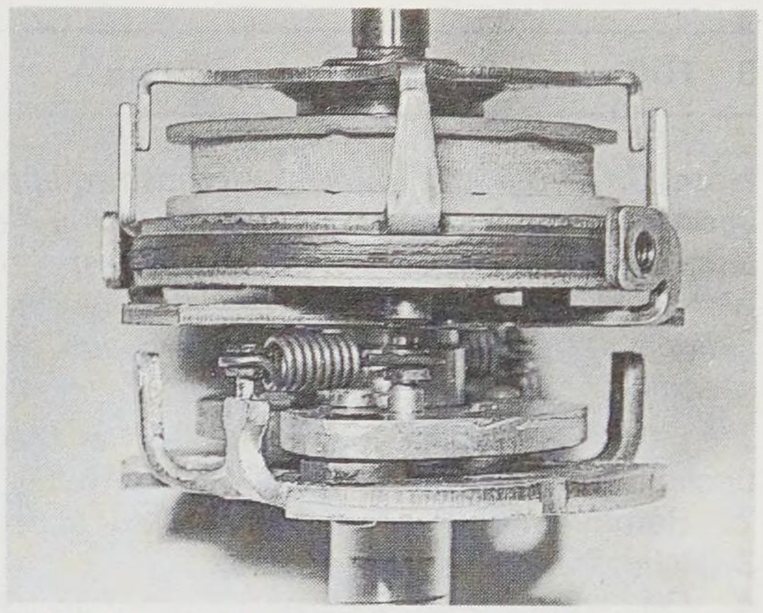
5.22A Refit the rotor ...



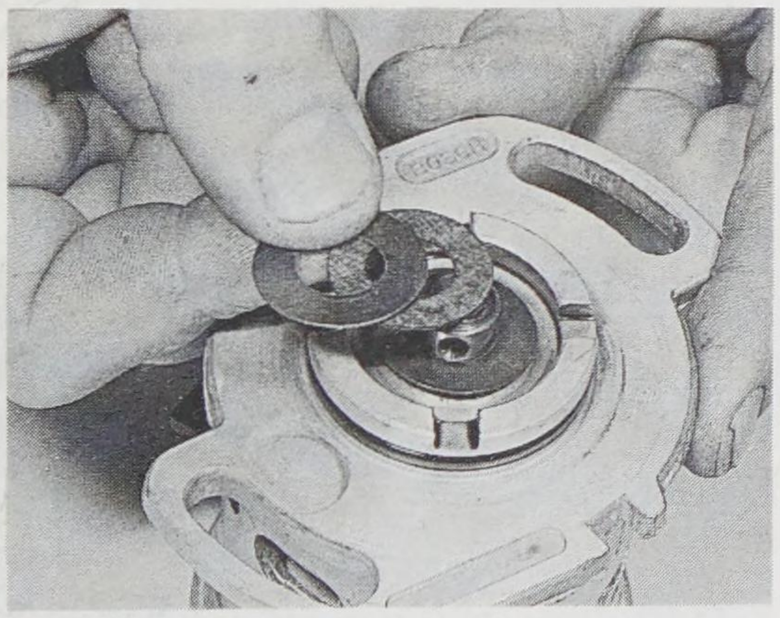
5.22B ... insert the pin (arrowed) ...



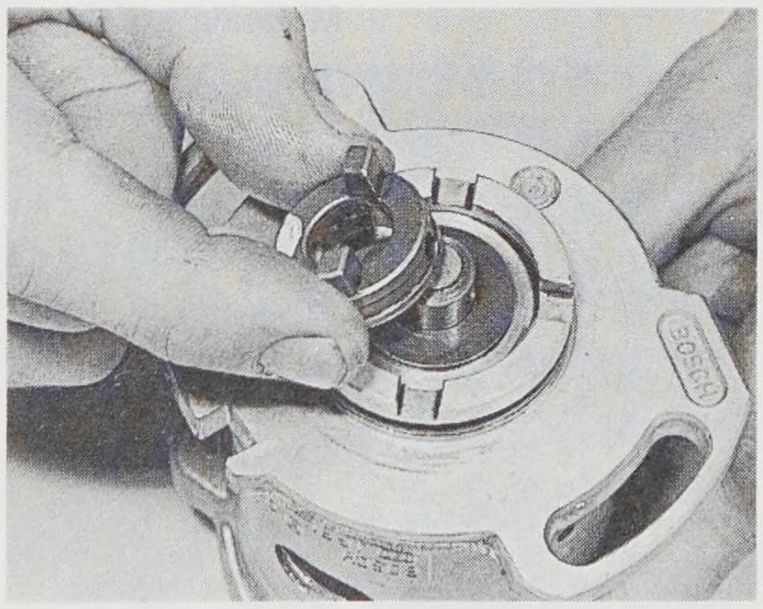
5.22C ... and tap it down flush



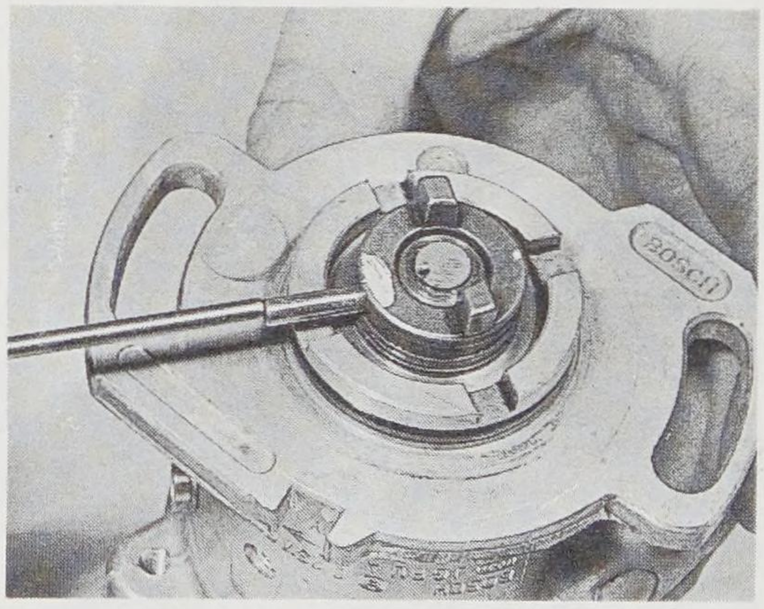
5.23 Bob weight springs fitted to the posts



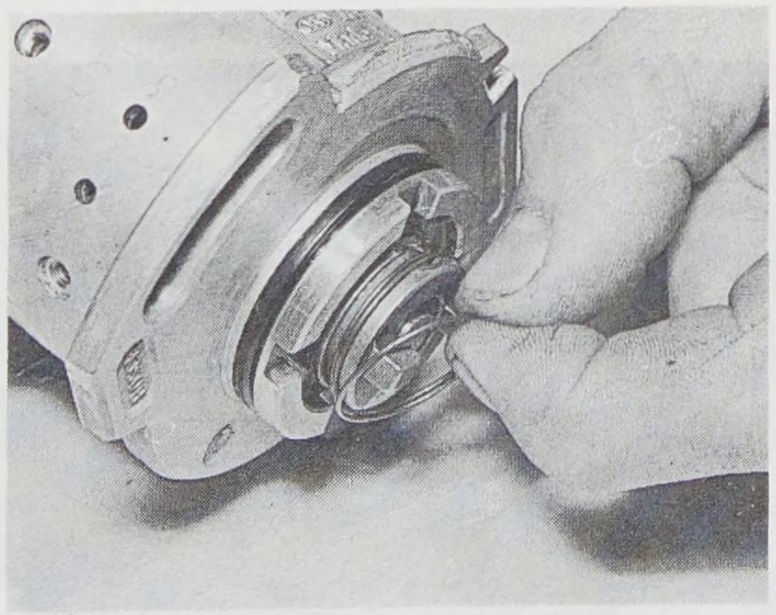
5.24 Fibre washer fits under the metal washer



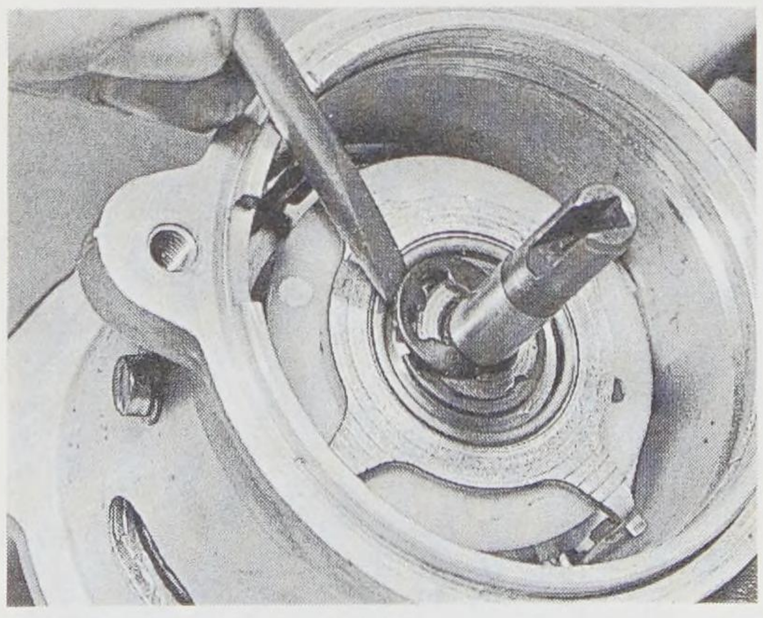
5.25A Fit the drive dog ...



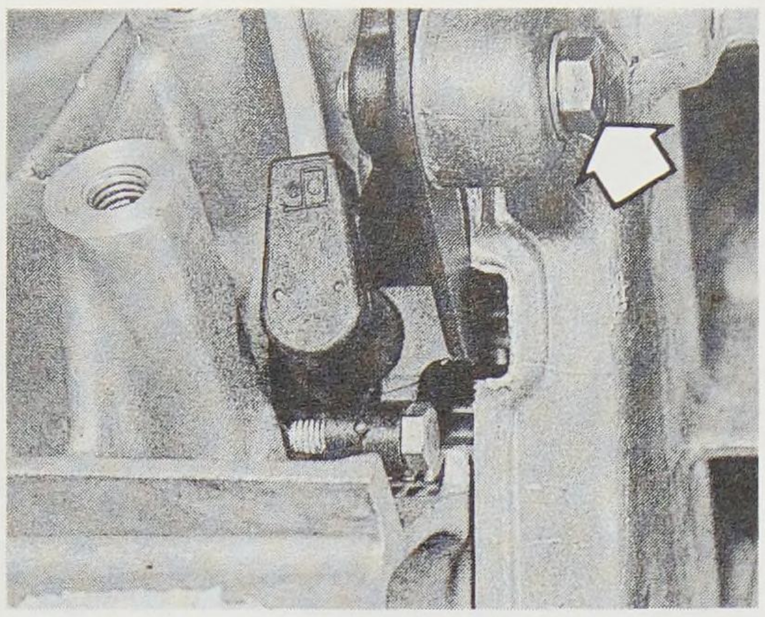
5.25B ... knock in the pin ...



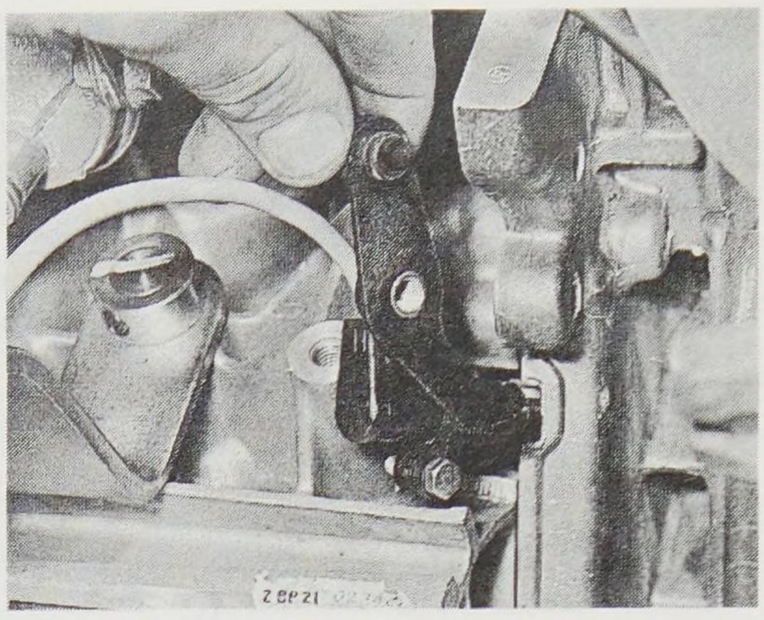
5.25C ... and fit the spring



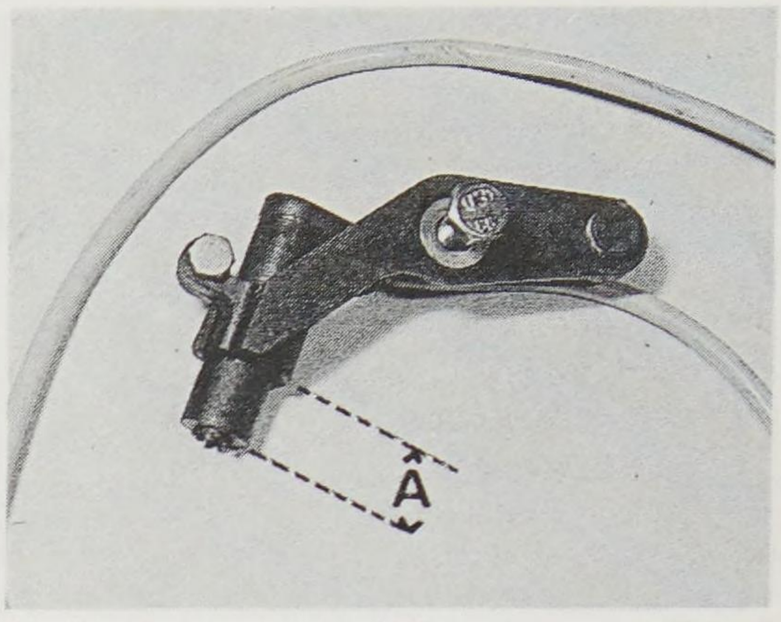
5.26 Fitting the top circlip



6.2 TDC sensor securing bolt (arrowed)



6.3 Withdrawing the sensor



6.4 Sensor protrusion 'A'

6 TDC sensor – removal and refitting

Note: *On carburettor models and those equipped with L3.1 Jetronic fuel injection, the TDC sensor is fitted for test and diagnostic purposes only, and is used in conjunction with special test equipment. On Mi 16 models with Motronic fuel injection, the TDC sensor is an integral part of the ignition system and provides information on crankshaft position and speed to the electronic control unit.*

1 Either disconnect the sensor lead at the connector (Motronic) or unclip the cable from the valve cover (others).
2 Remove the bolt securing the sensor to the engine rear web (photo).
3 Withdraw the sensor (photo).
4 On carburettor models and those with L3.1 Jetronic fuel injection, before releasing the clamp bolt, measure the sensor protrusion from the bracket so that the sensor can be fitted to the correct depth (photo).
5 Refitting is a reversal of removal, ensuring the locating spigot on the bracket enters the hole in the rear web, and where fitted that the clamp bolt is tight.
6 Tighten the bracket bolt and reconnect the lead or clip it back to the valve cover.

Note: *If a new clutch housing or flywheel/toothed rotor has been fitted to Mi 16 models with Motronic ignition, refer to Chapter 1, Section 30 – flywheel/toothed rotor overhaul for the TDC sensor air gap adjustment.*

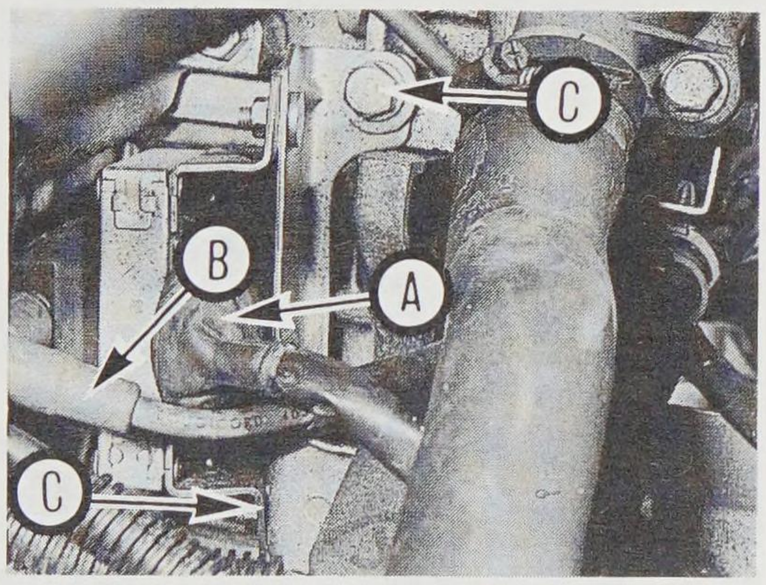
7 Coil – removing and refitting

Carburettor models

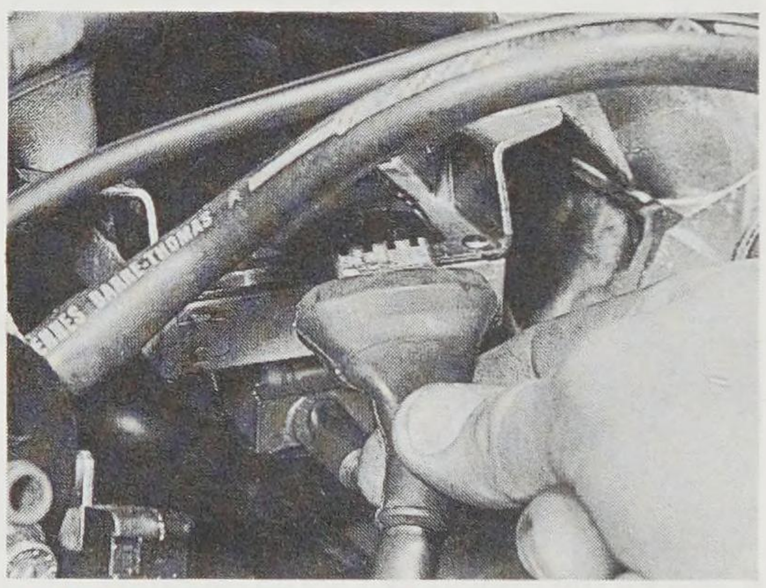
1 Disconnect the multi-plug and HT connection from the coil (photo).
2 Undo the bolts securing the coil to the cylinder block and withdraw the coil and bracket.
3 The coil can be separated from the bracket by undoing the nuts.

Fuel injection models

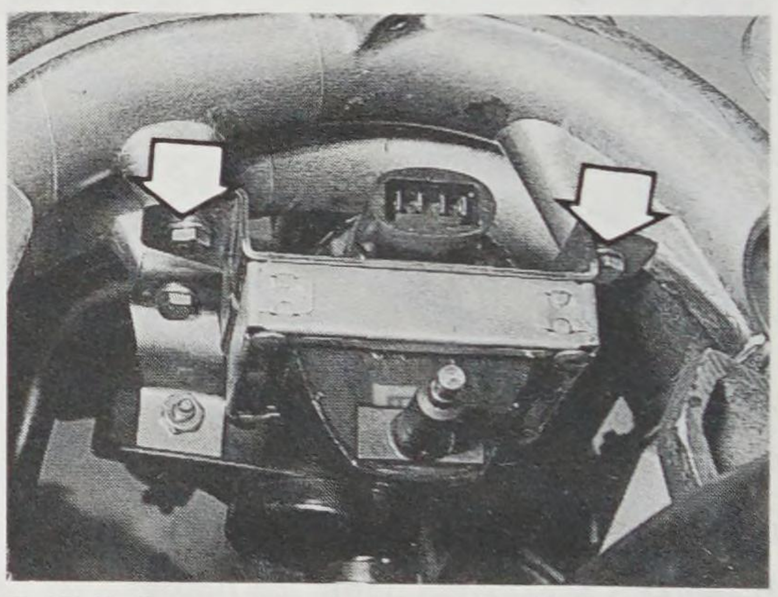
4 The procedure is the same, but on models with L3.1 Jetronic systems the coil is bolted to the underside of the inlet manifold and on Motronic systems to the side of the inlet manifold (photos).



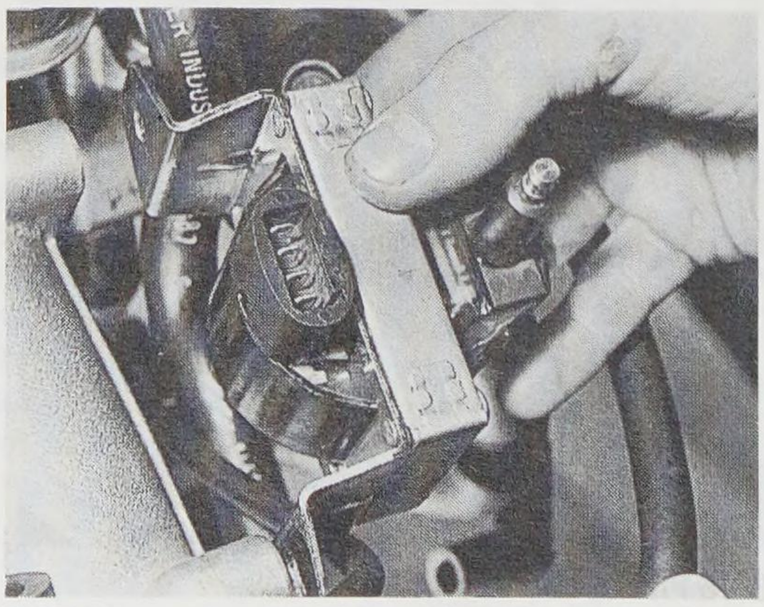
7.1 Multi-plug (A), HT connector (B) and securing bolts (C) on coil (carburettor models)



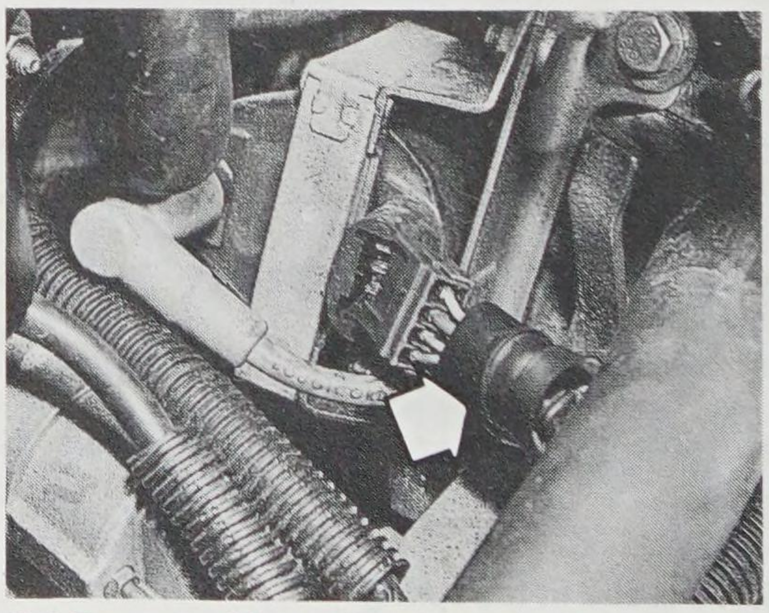
7.4A Disconnecting multi-plug on fuel injection (L3.1) models



7.4B Coil mounting bolts on fuel injection (L3.1) models (arrowed)



7.4C Removing ignition coil and bracket on Motronic ignition system



7.6 Ensure rubber cover is pushed back over terminals (arrowed)

Are your plugs trying to tell you something?

Normal.
Grey-brown deposits, lightly coated core nose. Plugs ideally suited to engine, and engine in good condition.

Heavy Deposits.
A build up of crusty deposits, light-grey sandy colour in appearance.
Fault: Often caused by worn valve guides, excessive use of upper cylinder lubricant, or idling for long periods.

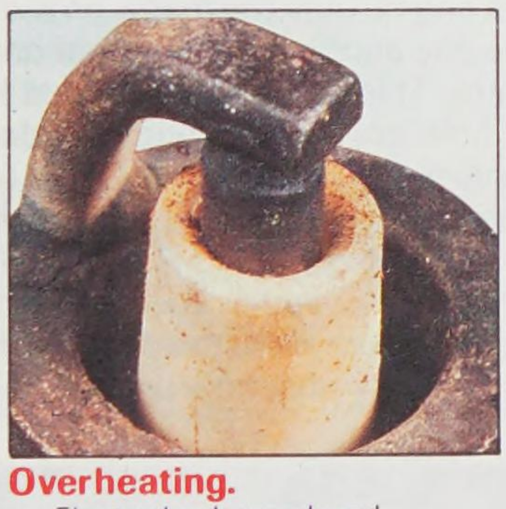
Lead Glazing.
Plug insulator firing tip appears yellow or green/yellow and shiny in appearance.
Fault: Often caused by incorrect carburation, excessive idling followed by sharp acceleration. Also check ignition timing.

Carbon fouling.
Dry, black, sooty deposits.
Fault: over-rich fuel mixture.
Check: carburettor mixture settings, float level, choke operation, air filter.

Oil fouling.
Wet, oily deposits. Fault: worn bores/piston rings or valve guides; sometimes occurs (temporarily) during running-in period.

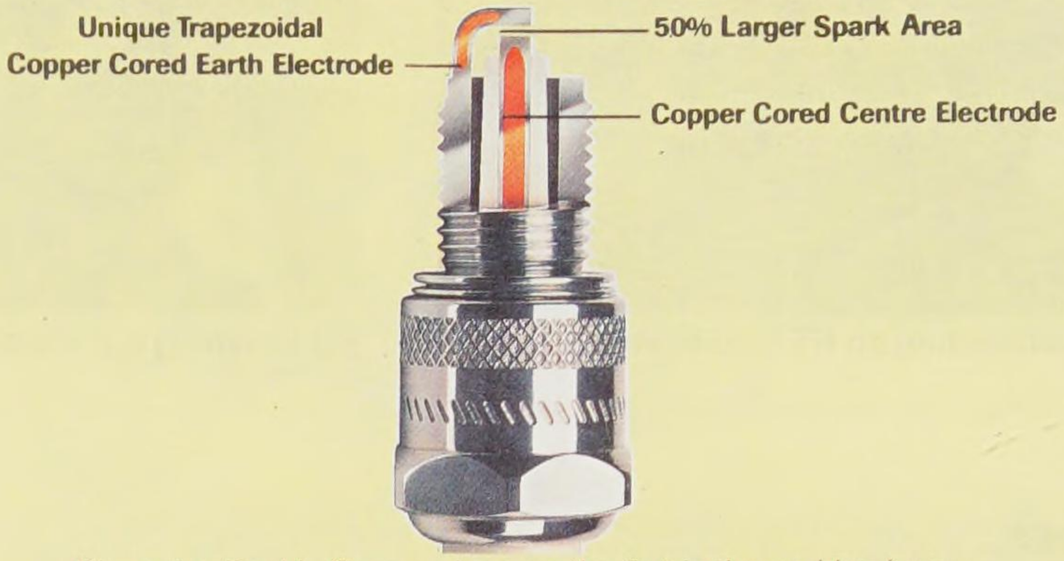
Overheating.
Electrodes have glazed appearance, core nose very white – few deposits. Fault: plug overheating. Check: plug value, ignition timing, fuel octane rating (too low) and fuel mixture (too weak).

Electrode damage.
Electrodes burned away; core nose has burned, glazed appearance. Fault: pre-ignition. Check: for correct heat range and as for 'overheating'.

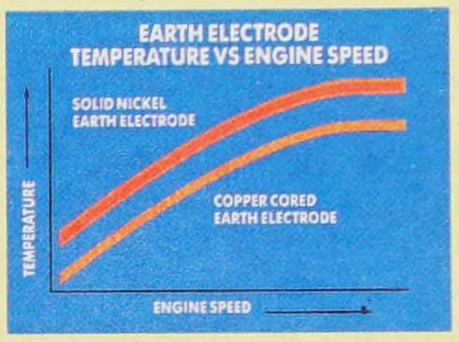


Split core nose.
(May appear initially as a crack). Fault: detonation or wrong gap-setting technique. Check: ignition timing, cooling system, fuel mixture (too weak).

WHY DOUBLE COPPER IS BETTER FOR YOUR ENGINE.



Champion Double Copper plugs are the first in the world to have copper core in both centre and earth electrode. This innovative design means that they run cooler by up to 100°C – giving greater efficiency and longer life. These double copper cores transfer heat away from the tip of the plug faster and more efficiently. Therefore, Double Copper runs at cooler temperatures than conventional plugs giving improved acceleration response and high speed performance with no fear of pre-ignition.



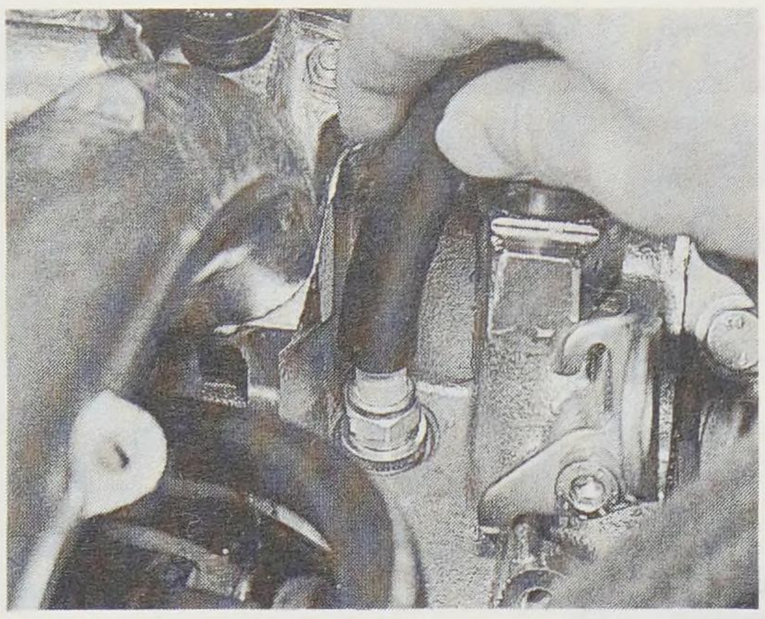
Champion Double Copper plugs also feature a unique trapezoidal earth electrode giving a 50% increase in spark area. This, together with the double copper cores, offers greatly reduced electrode wear, so the spark stays stronger for longer.

- **FASTER COLD STARTING**
- **FOR UNLEADED OR LEADED FUEL**
- **ELECTRODES UP TO 100°C COOLER**
- **BETTER ACCELERATION RESPONSE**
- **LOWER EMISSIONS**
- **50% BIGGER SPARK AREA**
- **THE LONGER LIFE PLUG**

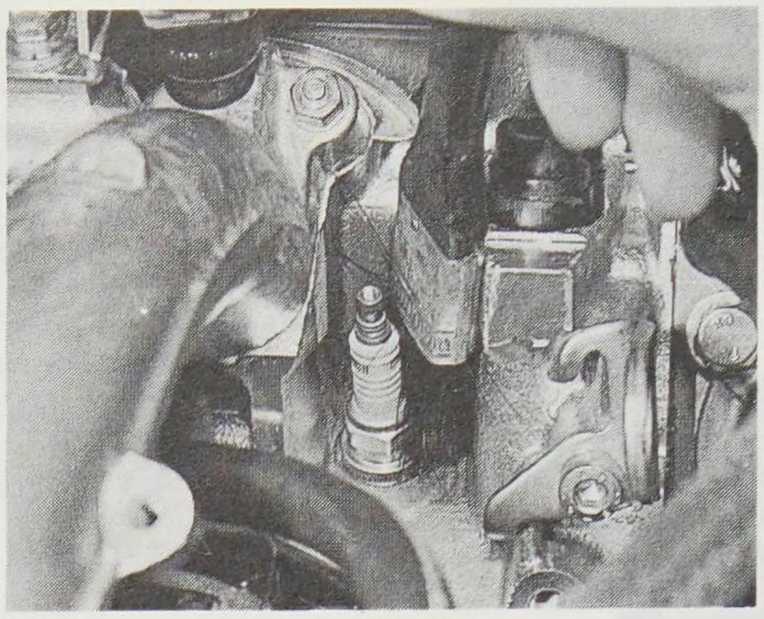
Plug Tips/Hot and Cold.
Spark plugs must operate within well-defined temperature limits to avoid cold fouling at one extreme and overheating at the other.
Champion and the car manufacturers work out the best plugs for an engine to give optimum performance under all conditions, from freezing cold starts to sustained high speed motorway cruising.
Plugs are often referred to as hot or cold. With Champion, the higher the number on its body, the hotter the plug, and the lower the number the cooler the plug. For the correct plug for your car refer to the specifications at the beginning of this chapter.

Plug Cleaning
Modern plug design and materials mean that Champion no longer recommends periodic plug cleaning. Certainly don't clean your plugs with a wire brush as this can cause metal conductive paths across the nose of the insulator so impairing its performance and resulting in loss of acceleration and reduced m.p.g.
However, if plugs are removed, always carefully clean the area where the plug seats in the cylinder head as grit and dirt can sometimes cause gas leakage.
Also wipe any traces of oil or grease from plug leads as this may lead to arcing.

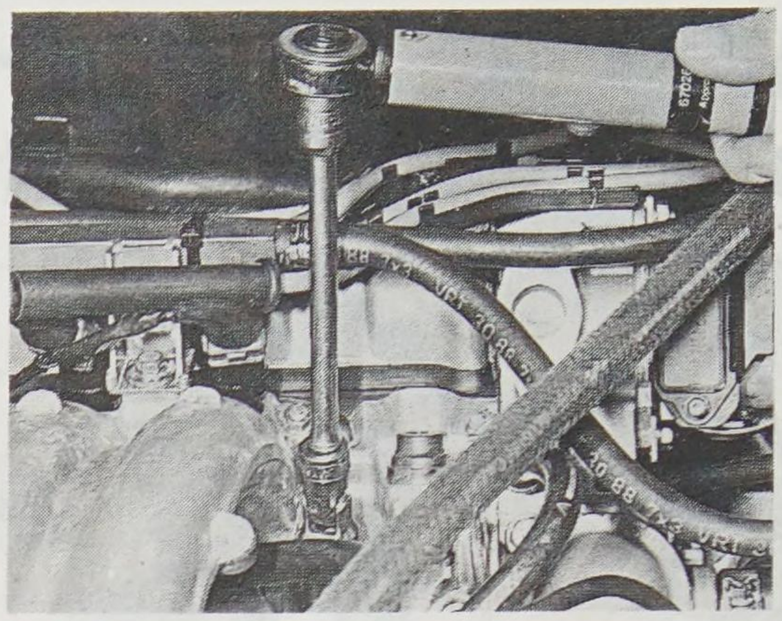
CHAMPION
DOUBLE COPPER



8.2 Disconnecting an HT lead from a spark plug



8.3 Brushing out a spark plug recess



8.12 Torque loading a spark plug

All types

5 Resistance values for testing the coil are given in the Specifications.

6 Refitting is a reversal of removal, ensuring the rubber cover is pushed back over the terminals (photo).

8 Spark plugs – removal and refitting

1 The correct functioning of the spark plugs is vital for the correct running and efficiency of the engine. It is essential that the plugs fitted are appropriate for the engine, and the suitable type is specified at the beginning of this Chapter. If the correct type is used and the engine is in good condition, the spark plugs should not need attention between scheduled replacement intervals. Spark plug cleaning is rarely necessary and should not be attempted unless specialised equipment is available as damage can easily be caused to the firing ends.

2 To remove the plugs, first open the bonnet and mark the HT leads one to four, so they correspond to the correct cylinder (number one cylinder is at the flywheel end of the engine). Pull the HT leads from the plugs by gripping the end fitting, not the lead otherwise the lead connection may be fractured (photo).

3 It is advisable to remove the dirt from the spark plug recesses using a clean brush, vacuum cleaner, or compressed air before removing the plugs, and to prevent dirt from dropping into the cylinders (photo).

4 Unscrew the plugs using a spark plug spanner, suitable box spanner or a deep socket and extension bar. As each plug is removed, examine it as follows.

5 Examination of the spark plugs will give a good indication of the condition of the engine. If the insulator nose of the spark plug is clean and white, with no deposits, this is indicative of a weak mixture or too hot a plug (a hot plug transfers heat away from the electrode slowly, a cold plug transfers heat away quickly).

6 If the tip and insulator nose are covered with hard black-looking deposits, then this is indicative that the mixture is too rich. Should the plug be black and oily, then it is likely that the engine is fairly worn, as well as the mixture being too rich.

7 If the insulator nose is covered with light tan to greyish brown deposits, then the mixture is correct and it is likely that the engine is in good condition.

8 The spark plug gap is of considerable importance as, if it is too large or too small, the size of the spark and its efficiency will be seriously impaired. For the best results the spark plug gap should be set in accordance with the Specifications at the beginning of this Chapter.

9 To set it, measure the gap with a feeler gauge, and then bend open, or close, the outer plug electrode until the correct gap is achieved. The centre electrode should never be bent, as this may crack the insulation and cause plug failure, if nothing worse.

10 Special spark plug electrode gap adjusting tools are available from most motor accessory shops.

11 Before fitting the spark plugs check that the threaded connector sleeves are tight and that the plug exterior surfaces and threads are clean.

12 Screw in the spark plugs by hand where possible, then tighten them to the specified torque (photo). Take extra care to enter the plug threads correctly as the cylinder head is aluminium and thread stripping could result.

13 Reconnect the HT leads in their correct order.

9 Ignition timing – checking and adjusting

Note: *The following procedure is applicable to all models except the Mi 16. Ignition timing on Mi 16 models is not adjustable and is controlled automatically by the Motronic engine management system.*

1 The ignition timing can be checked statically in order to set the ignition sufficiently accurately to start the engine. Once the engine is running, ignition timing must be set dynamically, using a phase lag type strobe lamp.

2 A phase lag strobe lamp is one which can be adjusted to the specified number of degrees advance. This is necessary because there is only one timing mark on the flywheel which indicates TDC. Without the adjustment on the strobe lamp the marks will not line up during dynamic timing.

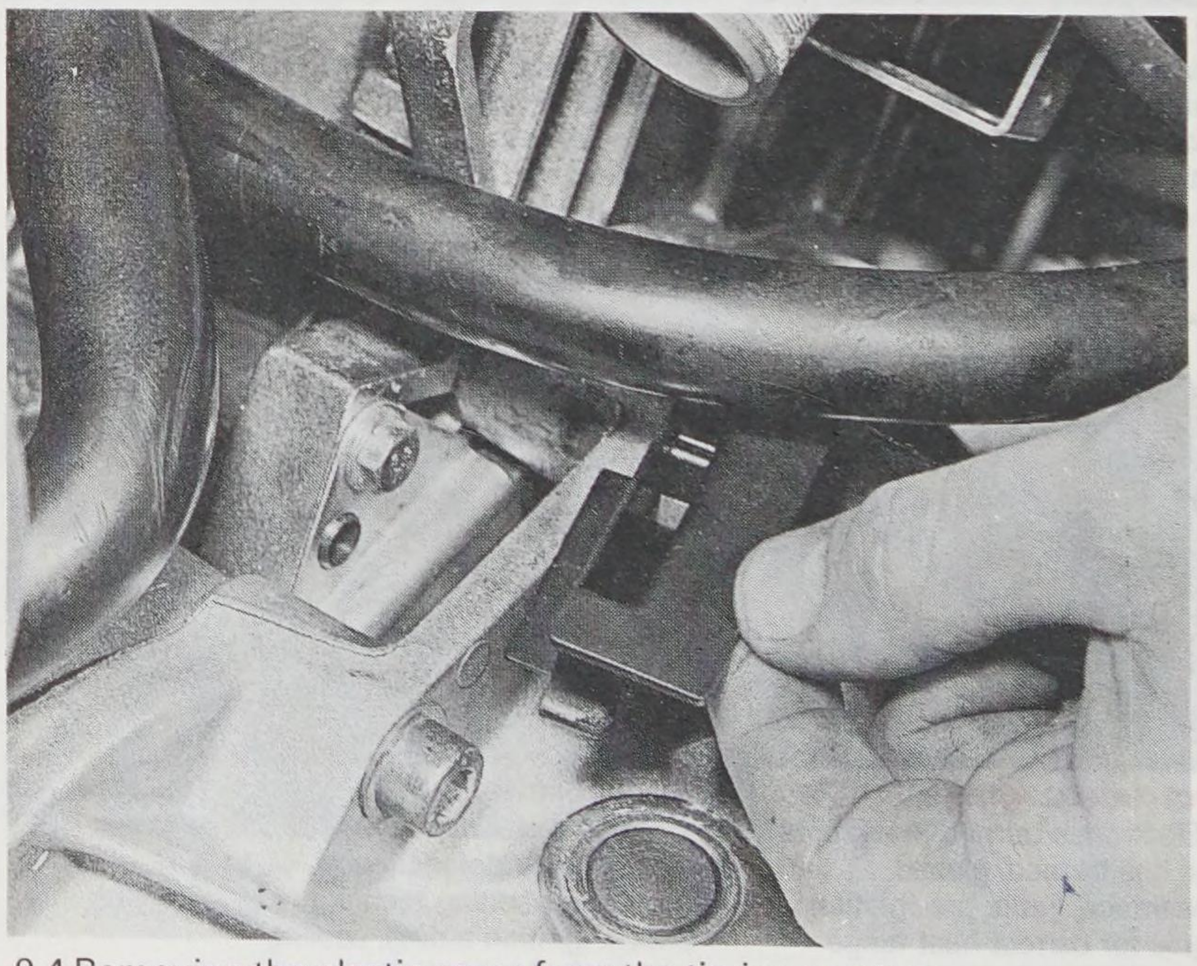
3 To set the ignition timing statically, remove the spark plugs which makes it easier to turn the engine.

4 Remove the plastic cover from the timing mark aperture on the clutch bell housing (photo).

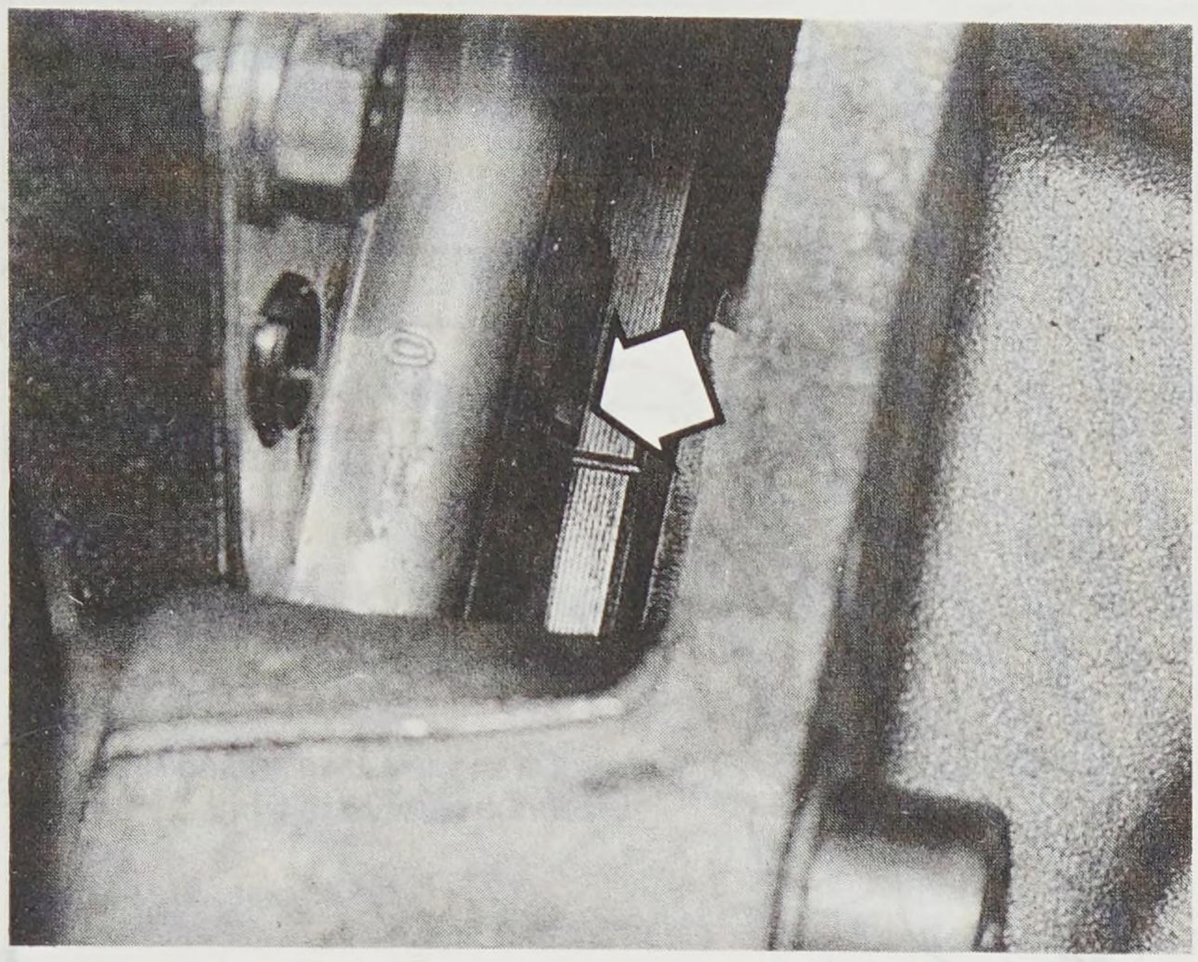
5 Turn the engine until the marks on the flywheel and the timing plate are opposite one another with number one cylinder on its compression stroke (photo). This can be determined by placing a thumb over the spark plug hole on number one cylinder (nearest the flywheel) and feeling the pressure build up.

6 With the engine set in this position check that the rotor arm in the distributor is pointing to the HT terminal in the distributor cap which serves number one cylinder. Loosen the distributor clamp nut and turn the distributor as necessary to adjust. Tighten the nut on completion.

7 Dynamic timing must now be carried out.



9.4 Removing the plastic cover from the timing aperture



9.5 Timing marks on flywheel and timing plate (arrowed)

8 Connect a phase lag strobe lamp and where necessary a tachometer to the engine in accordance with the maker's instructions.
9 Start and run the engine until it reaches normal operating temperature.
10 Disconnect the distributor vacuum hose from the distributor and plug the end of the hose.
11 Set the strobe lamp to the specified number of degrees advance.
12 Point the lamp at the timing marks on the flywheel which, when the timing is adjusted correctly, will appear opposite one another with the engine running at the specified idle speed.
13 To bring the timing marks in line, loosen the distributor clamp nut and turn the distributor as required. Tighten the clamp nut on completion.
14 To check the vacuum advance unit, reconnect the vacuum pipe and the marks should move apart, indicating that the vacuum is working.
15 Stop the engine, remove all test equipment and fit the cover to the timing mark aperture.
Note: *If, despite the correct setting of the ignition timing, a light knock or pinking can be heard during acceleration the following action should be taken. Disconnect the vacuum pipe from the distributor. If the noise is reduced, obtain and fit a vacuum delay valve to the vacuum pipe, black side toward the carburettor (these valves are obtainable from Peugeot dealers). If the noise is still apparent, retard ignition timing by 2 degrees.*

10 Fault diagnosis – ignition system

General

1 If the engine fails to start and the car was running normally when it was last used, first check that there is fuel in the fuel tank. If the engine turns over normally on the starter motor and the battery is evidently well charged first check the HT (high tension) circuit.
2 A common reason for bad starting is wet or damp spark plug leads and distributor cap. Check both items and wipe dry, if necessary.
3 If the engine still fails to start, disconnect an HT lead from any spark plug and, using a nail inserted into the end fitting, hold the lead approximately 5.0 mm (0.2 in) away from the cylinder head with well-insulated pliers. While an assistant spins the engine on the starter motor, check that a regular blue spark occurs. If so the spark plugs are probably the cause of the engine not starting and they should therefore be cleaned and regapped.
4 If no spark occurs, disconnect the main feed HT lead from the distributor cap and check for a spark as in paragraph 3. If sparks now occur, check the distributor cap, rotor arm, and HT leads, as described in Section 4, and renew them as necessary.
5 Check the security of the wiring to the ignition coil, distributor and ignition module.
6 If the engine still fails to start, the following step-by-step procedure may be used to check the complete ignition system.

Test procedure for electronic ignition systems (carburettor and L3.1 Jetronic fuel injection models)

Note: *For the following tests the battery must be in a fully charged condition and a good quality voltmeter must be available. Ensure that the ignition is switched off when disconnecting or reconnecting any of the wiring connectors indicated. The 'U' numbers refer to the test points shown in Fig. 4.2.*

Test conditions	Test	Remedy
Connect strobe lamp to coil HT lead and operate starter	Does the lamp flash?	*Yes* – check the rotor arm, distributor cap, HT leads and spark plugs *No* – go to next test
Connect positive terminal of coil direct to battery and operate starter	Does the lamp flash?	*Yes* – check the ignition switch circuit for continuity and resistance *No* – go to next test
Reconnect the coil normally and switch on ignition	Is there battery voltage at negative coil terminal (U1)?	*Yes* – check for battery voltage at coil centre terminal (U2). If battery voltage is not present, renew the coil; if battery voltage is present, check the coil primary and secondary circuit resistances; if not correct renew the coil; if correct, check the ignition module (see following sections) *No* – go to next test
Disconnect ignition module wiring plug	Is there battery voltage at negative coil terminal (U1)?	*Yes* – check the ignition module (see following sections) *No* – go to next test
Switch on ignition	Is there battery voltage at positive coil terminal (U3)?	*Yes* – renew the coil *No* – check continuity of positive supply to coil

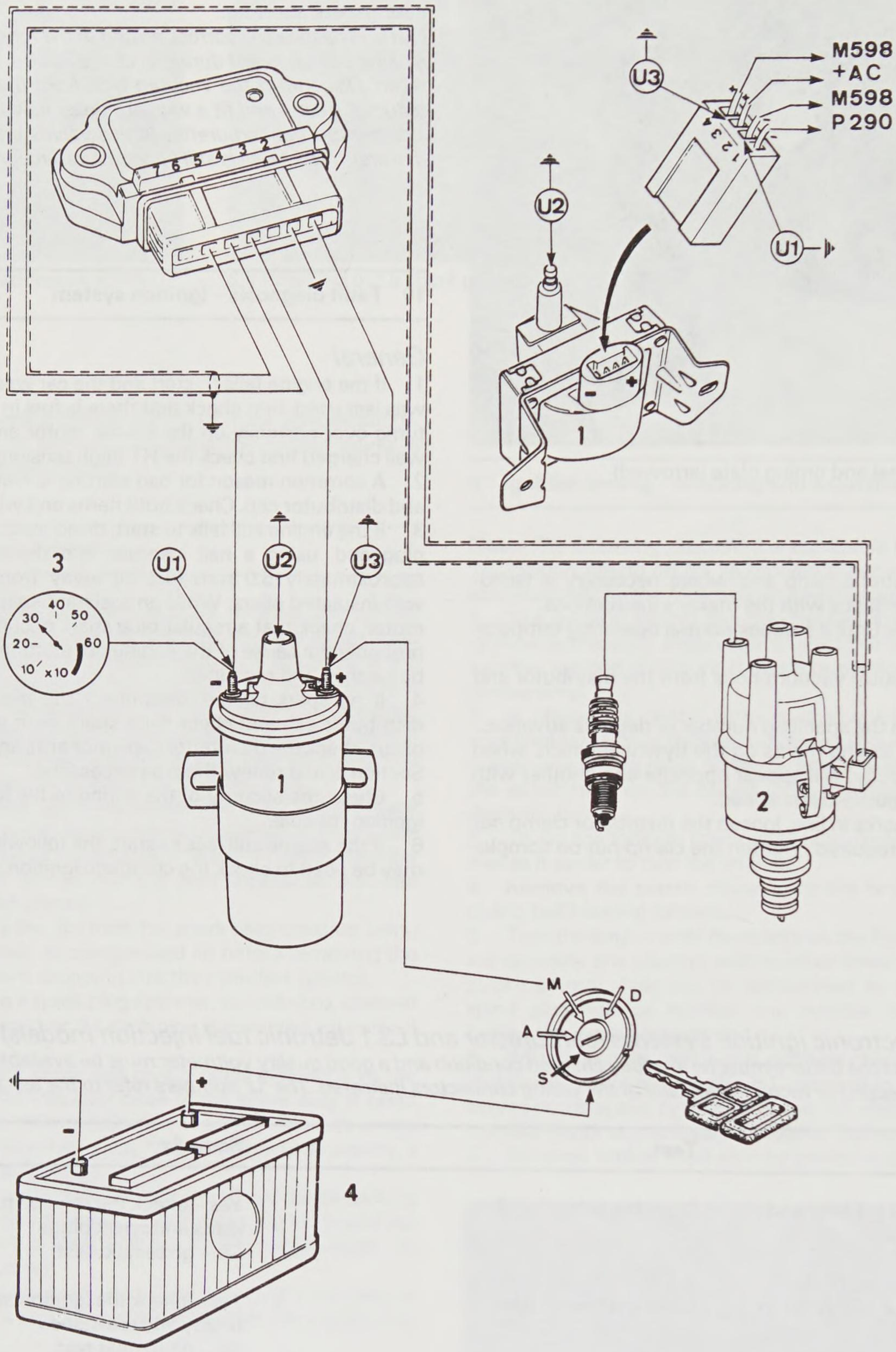


Fig 4.2 Ignition system test points and circuit arrangement – carburettor and L3.1 Jetronic fuel injection models (Sec 10)

1 Coil
2 Distributor
3 Tachometer
4 Battery

The 'U' numbers indicate the test points – see text

Test procedure for externally mounted ignition models (carburettor and L3.1 Jetronic fuel injection models)

Note: *For the following tests the battery must be in a fully charged condition and a good quality voltmeter must be available. The checks are made at the rear of the module connector with the connector disconnected. Ensure that the ignition is switched off when disconnecting or reconnecting any of the wiring connectors indicated. The 'U' numbers refer to the test points shown in Fig. 4.3.*

Test condition	Test	Remedy
With ignition on check voltage at terminal 1 of module connector (U4)	Is battery voltage obtained?	*Yes* – go to next test *No* – check continuity of circuit negative terminal and module connector, and its insulation from earth
With ignition on check voltage at terminal 4 of module connector	Is battery voltage obtained?	*Yes* – go to next test *No* – check continuity of positive supply to module
With ignition on check voltage between terminals 2 and 4 of module connector	Is battery voltage obtained?	*Yes* – go to next test *No* – check earthing of terminal 2 of module
Operate starter	There should be voltage between terminal 5 and 6 on module connector	*Yes* – renew ignition module *No* – check continuity of circuit between module connector on distributor (U7) and the module. If OK renew the rotor/stator assembly

Test procedure for distributor mounted ignition module (carburettor and L3.1 Jetronic fuel injection models)

Note: *For the following tests the battery must be in a fully charged condition and a good quality voltmeter must be available. The checks are made at the rear of the module connector with the connector disconnected. Ensure that the ignition is switched off when disconnecting or reconnecting any of the wiring connectors indicated. The 'U' numbers refer to the test points shown in Fig. 4.4.*

Test condition	Test	Remedy
Switch on ignition	There should be battery voltage at terminal 1 of module connector	*Yes* – go to next test *No* – check continuity of circuit between coil negative terminal and module connector, and its insulation from earth – check insulation of tachometer circuit
Switch on ignition	There should be battery voltage at terminal 3 of module connector	*Yes* – go to next test *No* – check continuity of ignition positive supply to module
Switch on ignition	There should be battery voltage between terminals 2 and 3 on module connector	*Yes* – go to next test *No* – check earthing of terminal 2 on module
Operate starter	There should be voltage between terminals 5 and 6 on module connector	*Yes* – renew ignition module *No* – renew rotor/stator assembly

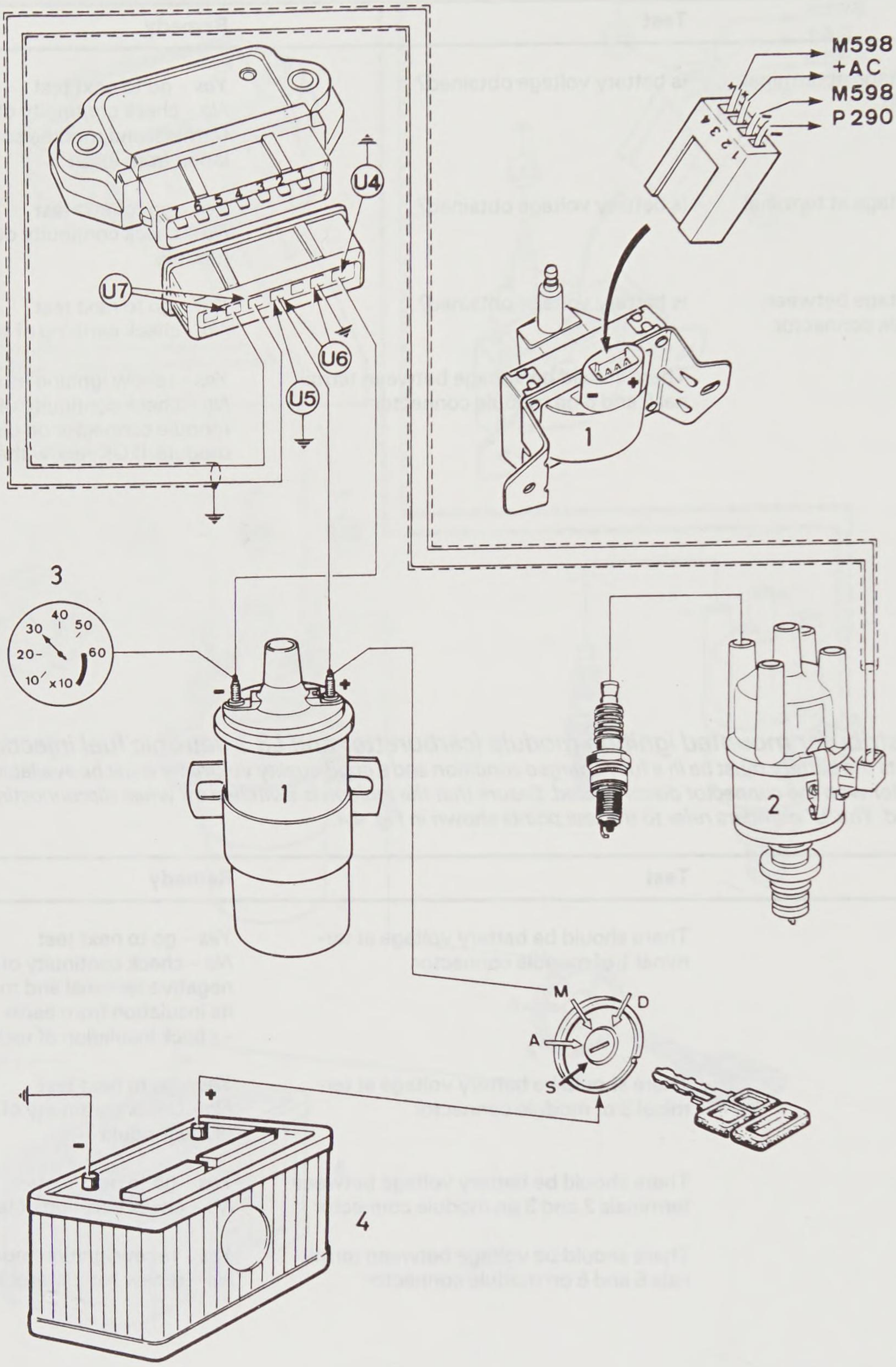


Fig 4.3 External ignition module test points and circuit arrangement – carburettor and L3.1 Jetronic fuel injection models (Sec 10)

1 Coil
2 Distributor
3 Tachometer
4 Battery
The 'U' numbers indicate the test points – see text

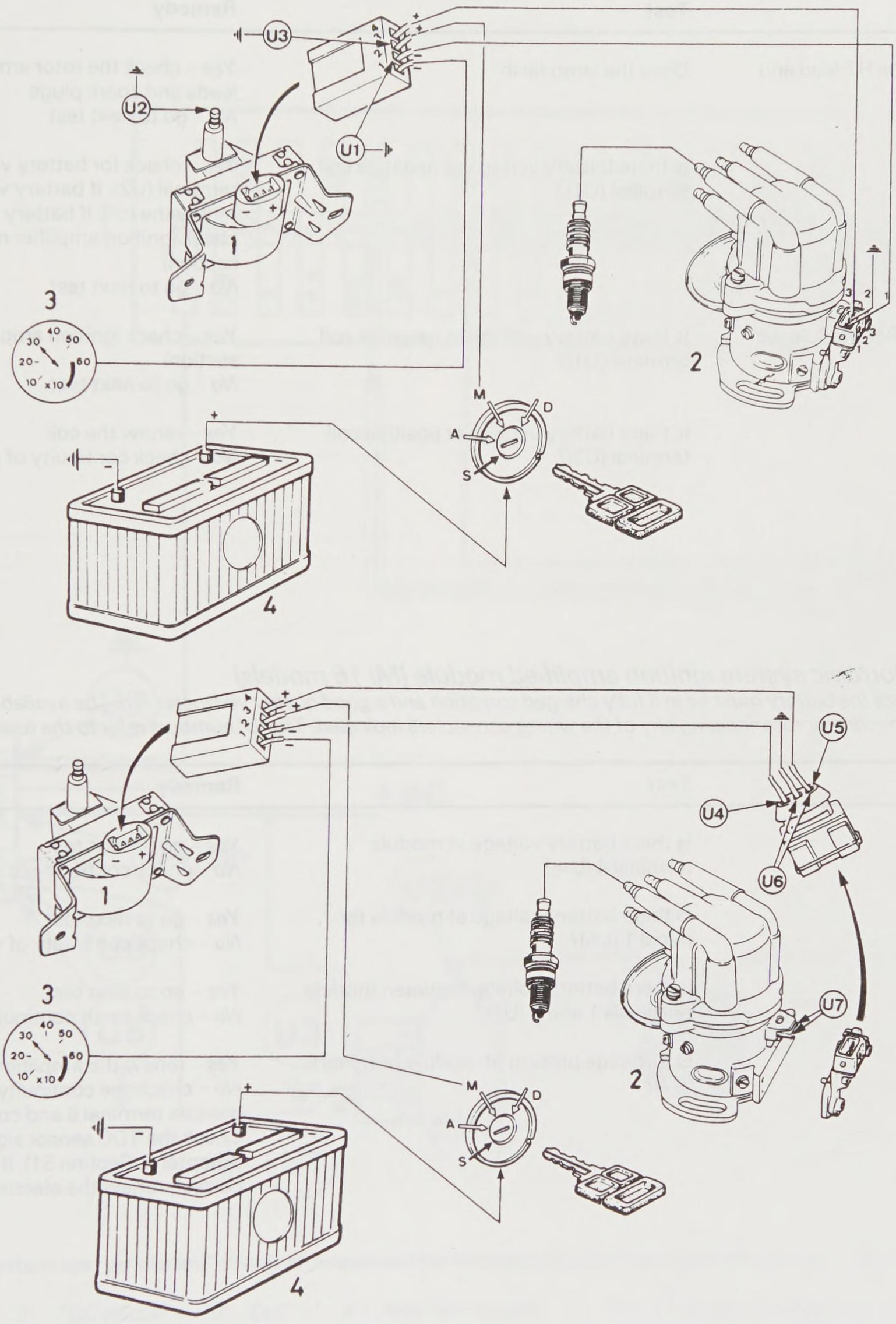


Fig 4.4 Integral ignition module test points and circuit arrangement – carburettor and L3.1 Jetronic fuel injection models (Sec 10)

1 Coil 2 Distributor 3 Tachometer 4 Battery The 'U' numbers indicate the test points – see text

Test procedure for Motronic engine management system (Mi 16 models)

Note: *For the following tests the battery must be in a fully charged condition and a good quality voltmeter must be available. Ensure that the ignition is switched off when disconnecting or reconnecting any of the wiring connectors indicated. The 'U' numbers refer to the test points shown in Fig. 4.5.*

Test conditions	Test	Remedy
Connect strobe lamp to coil HT lead and operate starter	Does the lamp flash?	*Yes* – check the rotor arm, distributor cap, HT leads and spark plugs *No* – go to next test
Switch on ignition	Is there battery voltage at negative coil terminal (U1)?	*Yes* – check for battery voltage at coil centre terminal (U2). If battery voltage is not present, renew the coil; if battery voltage is present, check ignition amplifier module (see next section) *No* – go to next test
Disconnect ignition amplifier module wiring plug	Is there battery voltage at negative coil terminal (U1)?	*Yes* – check ignition amplifier module (see next section) *No* – go to next test
Switch on ignition	Is there battery voltage at positive coil terminal (U3)?	*Yes* – renew the coil *No* – check continuity of positive supply to coil

Test procedure for Motronic system ignition amplified module (Mi 16 models)

Note: *For the following tests the battery must be in a fully charged condition and a good quality voltmeter must be available. Ensure that the ignition is switched off when disconnecting or reconnecting any of the wiring connectors indicated. The 'U' numbers refer to the test points shown in Fig. 4.5.*

Test conditions	Test	Remedy
Switch on ignition	Is there battery voltage at module terminal 4 (U4)?	*Yes* – go to next test *No* – check continuity of wire 2B
Ignition switched on	Is there battery voltage at module terminal 1 (U5)?	*Yes* – go to next test *No* – check continuity of wire 3A
Ignition switched on	Is there battery voltage between module terminals 1 and 2 (U6)?	*Yes* – go to next test *No* – check earth continuity, wire M3
Operate the starter	Is a voltage present at module terminal 6 (U7)?	*Yes* – renew the amplifier module *No* – check the continuity of wire 101 between module terminal 6 and control unit terminal 1. Check the TDC sensor signal to the control unit (Chapter 3, Section 51). If above checks are correct, renew the electronic control unit

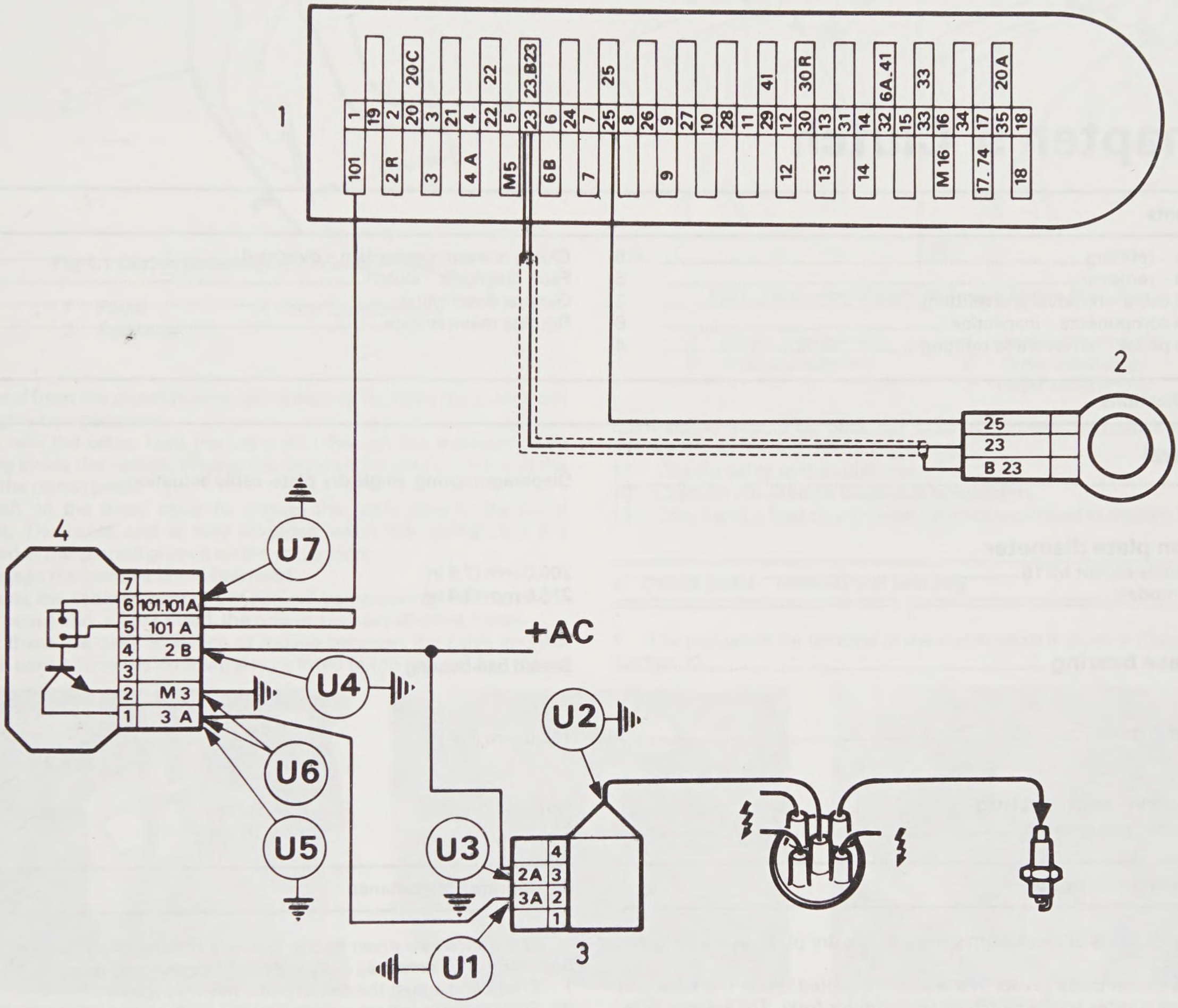


Fig 4.5 Ignition system test points and circuit arrangement for Motronic engine management system – Mi 16 models (Sec 10)

1 Control unit 2 TDC sensor 3 Coil 4 Amplifier module The 'U' numbers indicate the test points – see text

Chapter 5 Clutch

Contents

Clutch – refitting	8	Clutch release mechanism – overhaul	7
Clutch – removal	5	Fault diagnosis – clutch	9
Clutch cable – removal and refitting	3	General description	1
Clutch components – inspection	6	Routine maintenance	2
Clutch pedal – removal and refitting	4		

Specifications

General

Type	Diaphragm spring, single dry plate, cable actuation

Driven plate diameter

All models except Mi 16	200.0 mm (7.8 in)
Mi 16 models	215.0 mm (8.4 in)

Release bearing	Sealed ball-bearing
Pedal travel	145.0 mm (5.7 in)

Torque wrench setting

	Nm	lbf ft
Clutch-to-flywheel bolts	22	16

1 General description

The clutch is of diaphragm spring, single dry plate type with cable actuation.

The clutch pedal pivots in a bracket mounted under the facia and operates a cable to the clutch release arm (or fork). The release lever operates a thrust bearing (clutch release bearing) which bears on the diaphragm spring of the pressure plate, and releases the clutch driven plate from the flywheel. The driven plate (or disc) is splined to the gearbox input shaft.

The clutch release mechanism consists of a fork and bearing which are in permanent contact with release fingers on the pressure plate assembly. The fork pushes the release bearing forwards to bear against the release fingers, so moving the centre of the diaphragm spring inwards. The spring is sandwiched between two rings which act as fulcrum points. As the centre of the spring is pushed in, the outside of the spring is pushed out, so moving the pressure plate backwards and disengaging it from the clutch driven plate.

When the clutch pedal is released, the diaphragm spring forces the pressure plate into contact with the friction linings on the driven plate and at the same time pushes the driven plate a fraction of an inch forwards on its splines so engaging it with the flywheel. The driven plate is now firmly sandwiched between the pressure plate and the flywheel, so the drive is taken up.

As wear takes place on the driven plate friction linings the diaphragm fingers move outwards and the pedal stroke decreases; the cable mechanism requires an adjustment to compensate for this wear.

2 Routine maintenance

At the intervals given in the 'Routine maintenance' *Section at the beginning of this manual, carry out the following operations.*

1 Check and adjust the clutch pedal travel as follows.
2 Fully depress and release the clutch pedal several times to settle the mechanism.
3 Measure the pedal travel (see Fig. 5.1).
4 If the pedal travel is not as specified, loosen the locknut on the adjuster mechanism at the clutch release arm end of the cable and screw the adjuster in or out to obtain the correct pedal travel. Screwing the adjuster in will reduce pedal travel.
5 Tighten the locknut, operate the clutch pedal several times and recheck the pedal travel.

3 Clutch cable – removal and refitting

1 Working inside the vehicle, depress the spring clip on the clutch pedal plastic link assembly to release the inner cable end from the link (photo).
2 Working in the engine bay, pull back the bellows on the cable where it enters the bulkhead.
3 Pull on the cable outer sheath to disengage the cable stop on the pedal bracket. Withdraw the cable through the bulkhead (photo).
4 Release the cable from the clips on the subframe.
5 Pull the locking clip from the bracket on the gearbox and unhook the

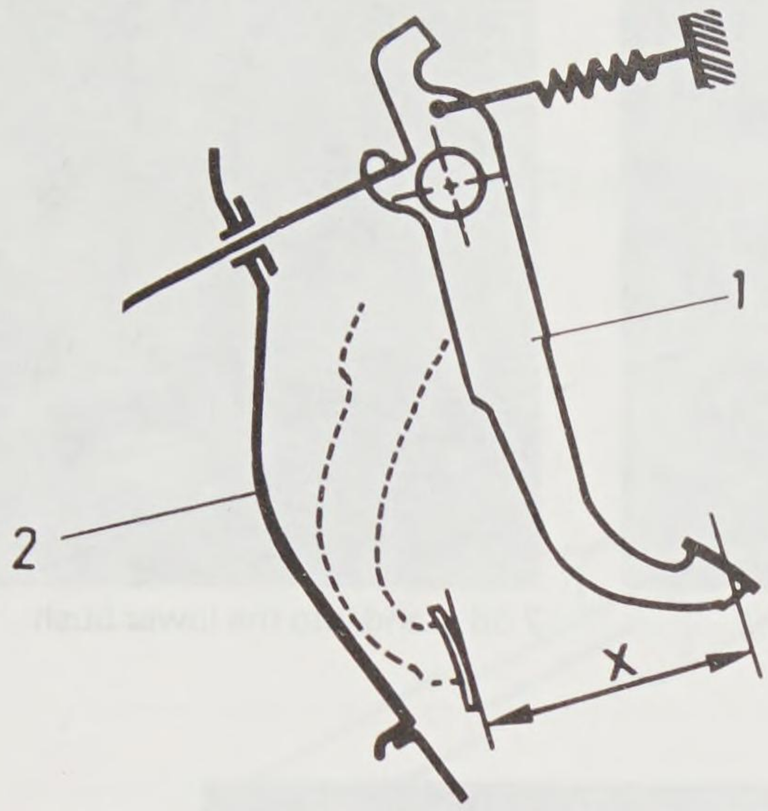


Fig 5.1 Clutch pedal travel dimension (Sec 2)

1 Pedal
2 Bulkhead
X – see Specifications

cable end from the clutch release arm (photos). Remove the cable from the engine compartment.

6 To refit the cable, feed the cable end through the bulkhead, then working inside the vehicle, engage the cable end in the plastic link at the top of the clutch pedal.

7 Push on the outer cable to engage the cable stop in the pedal bracket. The cable end is fully engaged when the spring clips are engaged in the second groove on the cable stop.

8 Engage the bellows in the bulkhead.

9 Route the cable in front of the anti-roll bar, ensuring it is free of the heater hoses and, where fitted, the power-assisted steering hoses.

10 If there has been evidence of fouling between the cable and the anti-roll bar and there is no foam sleeve fitted to the anti-roll bar, then a foam sleeve should be obtained from your dealer and stuck to the anti-roll bar to prevent the fouling (photo).

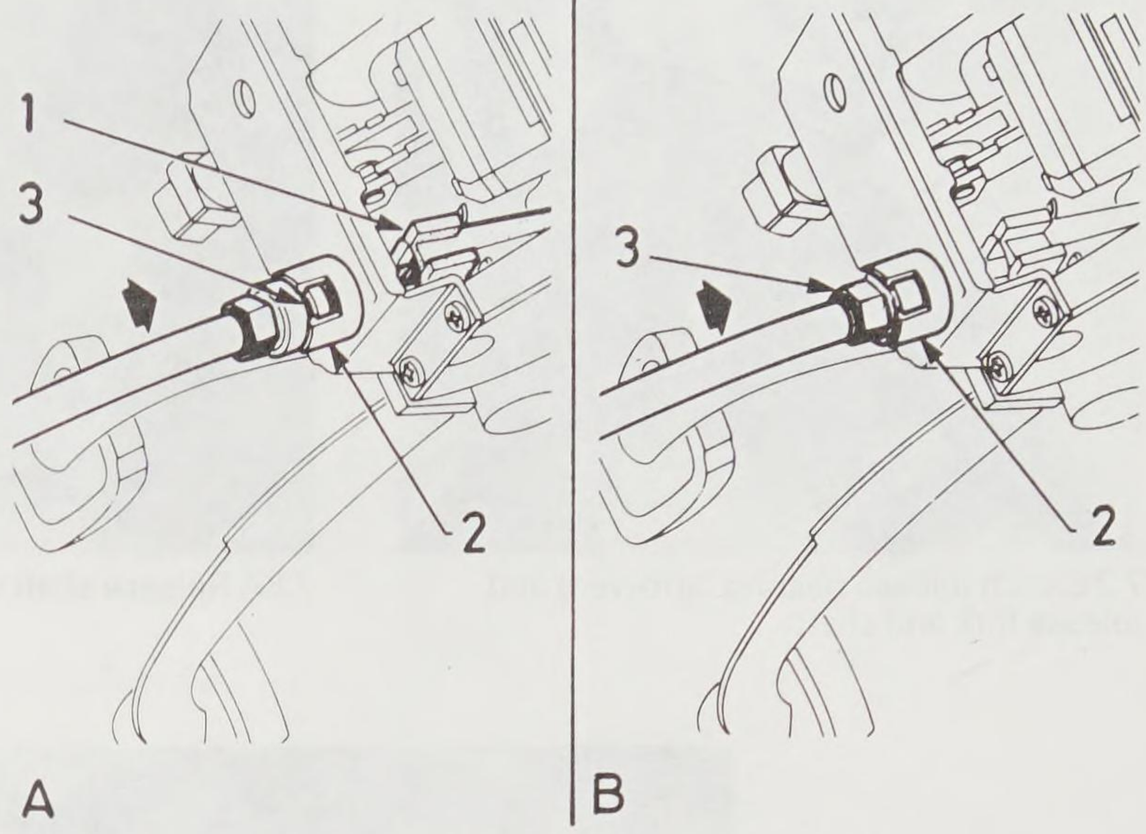


Fig 5.2 Showing clutch cable end fitting (Sec 3)

A Before engagement
B After engagement
1 Inner cable end clip
2 Outer cable stop
3 Outer cable end

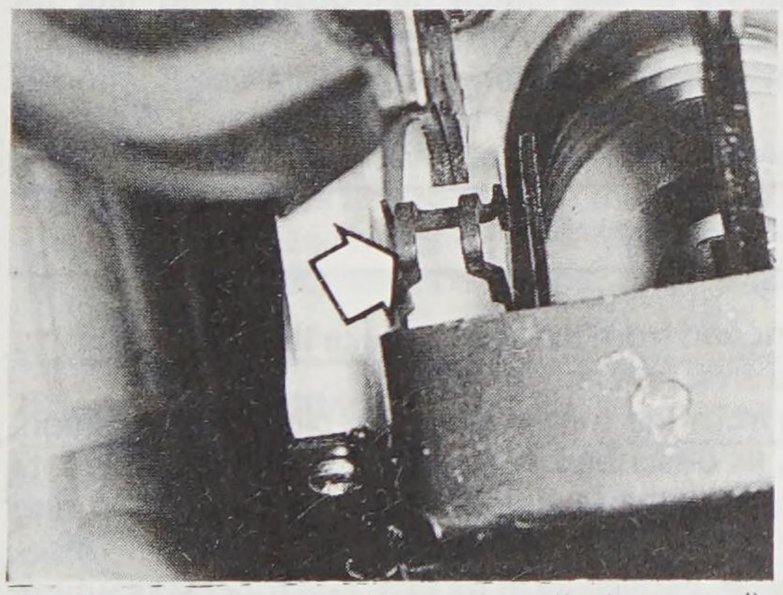
11 Clip the cable to the subframe.

12 Connect the cable to the clutch release arm.

13 Check and adjust clutch pedal travel as described in Section 2.

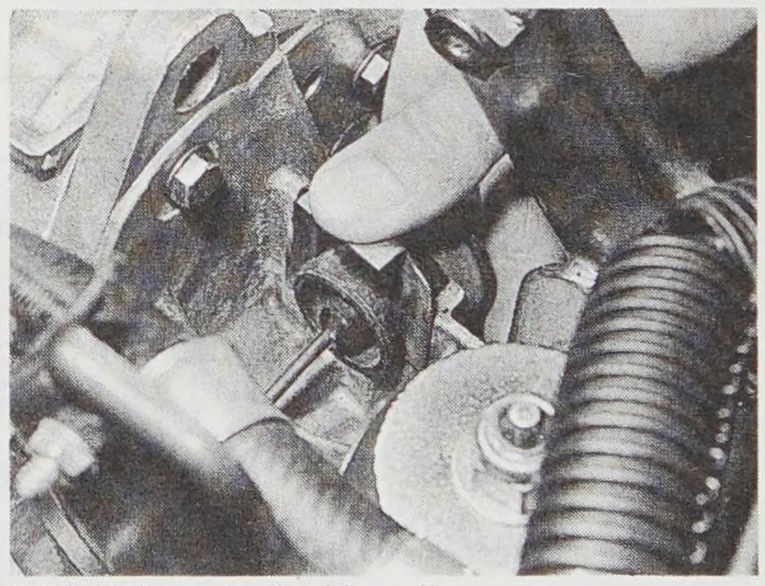
4 Clutch pedal – removal and refitting

1 The procedure for removal of the clutch pedal is given in Chapter 8, Section 23.

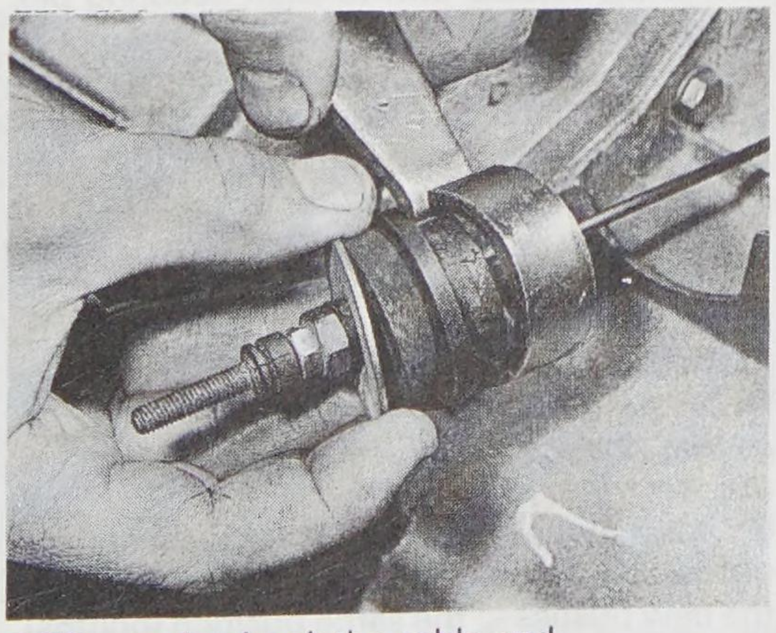


3.1 Showing inner cable spring clip (arrowed) at top of clutch pedal (cable removed)

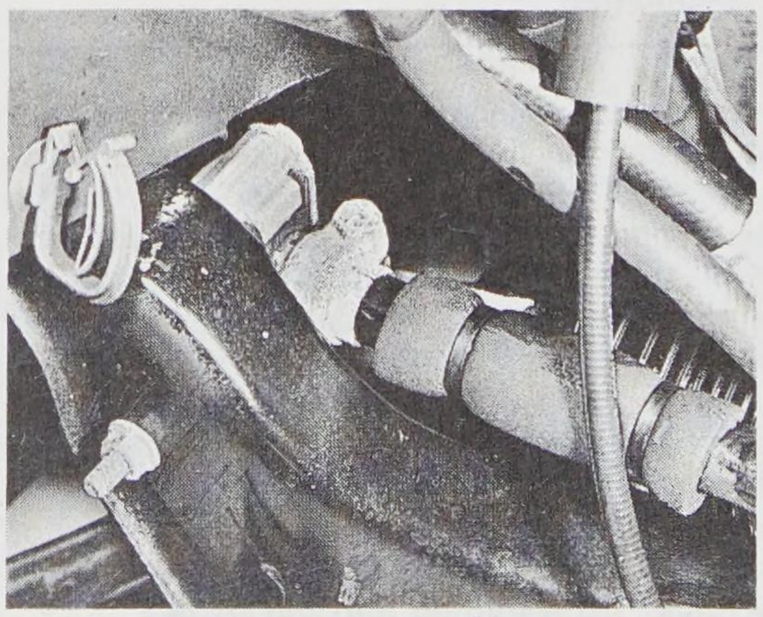
3.3 Cable end fitting being withdrawn from bulkhead



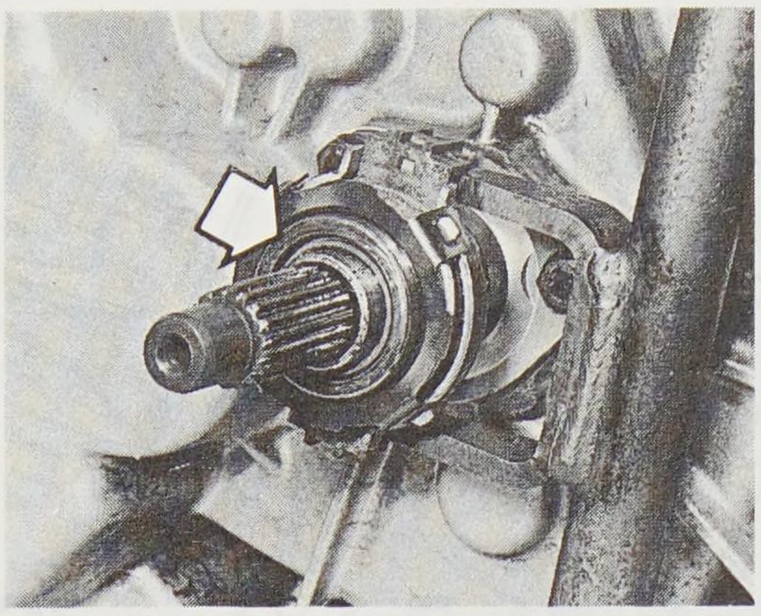
3.5A Pull up the locking clip ...



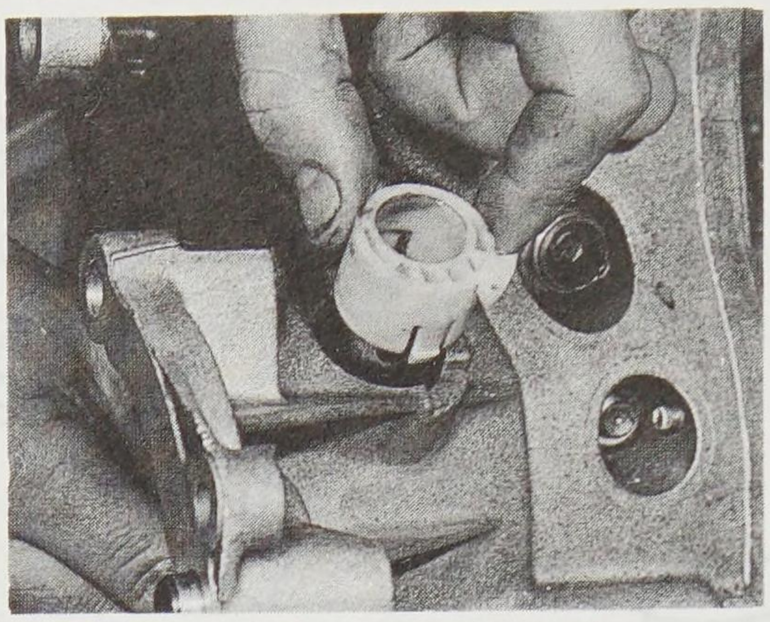
3.5B ... and unhook the cable end



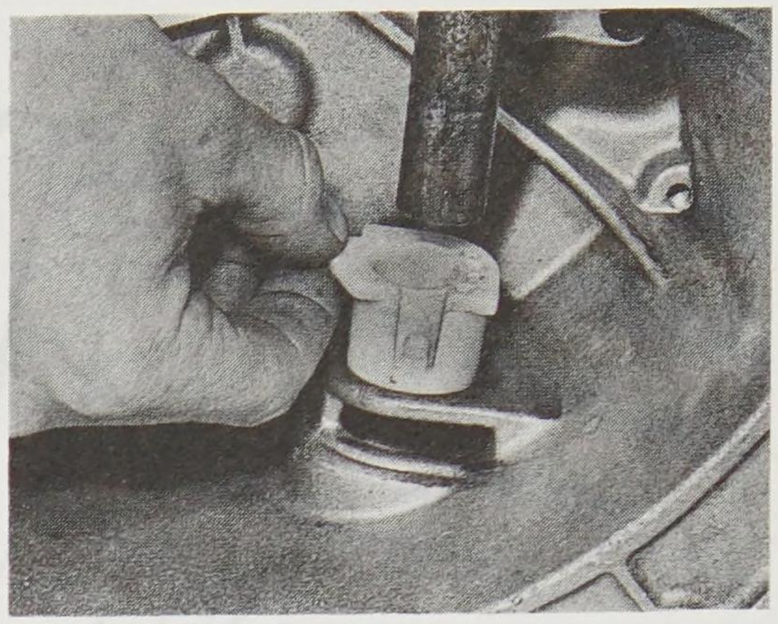
3.10 Foam sleeve on anti-roll bar



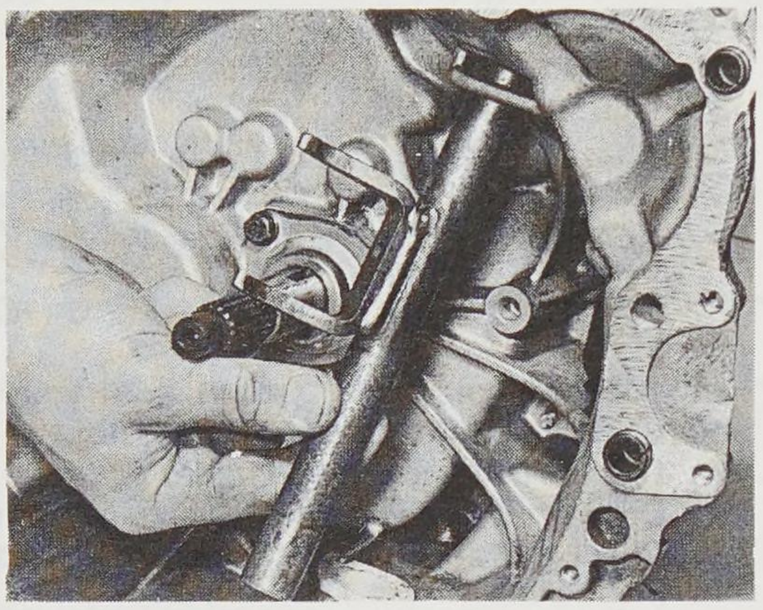
7.2 Clutch release bearing (arrowed) and release fork and shaft



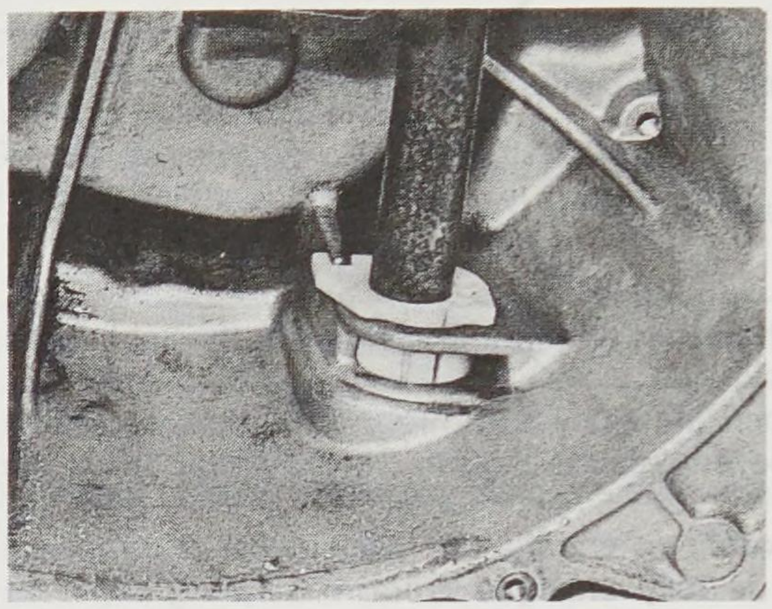
7.8A Release shaft upper nylon bush ...



7.8B ... and into the lower bush



7.9A Fitting the release shaft to the upper bush ...



7.9B ... and into the lower bush

2 On completion of refitting the pedal, adjust pedal travel as described in Section 2 of this Chapter.

5 Clutch – removal

Caution: *Asbestos material is used in the manufacture of some clutch components and care must be taken during the removal procedure not to inhale any disturbed dust, which can be harmful to the lungs*

1 Remove the gearbox as described in Chapter 6.
2 Make an alignment mark across the clutch pressure plate and the flywheel.
3 Progressively loosen the bolts securing the pressure plate to the flywheel.
4 Once all pressure exerted by the pressure plate on the flywheel has been relieved, remove all the bolts and lift off the pressure plate and driven plate.

6 Clutch components – inspection

1 Examine the friction surfaces of the flywheel and the pressure plate for scoring or cracks. Light scoring may be ignored. Excessive scoring or cracks can sometimes be machined off the flywheel face – consult a specialist. The pressure plate must be renewed if it is badly scored.
2 Inspect the pressure plate cover and the diaphragm spring for damage, or blue discolouration suggesting overheating. Pay attention to the tips of the spring fingers where the release bearing operates. Renew the pressure plate if in doubt.
3 Renew the driven plate if the friction linings are worn down to, or approaching, the rivets. If the linings are oil-soaked or have a hard black glaze, the source of oil contamination – the crankshaft rear oil seal or gearbox input shaft oil seal – must be dealt with before the plate is renewed. Also inspect the driven plate springs, hub and splines.
4 Note that if the driven plate only is renewed, problems may be experienced related to the bedding-in of the driven plate and old pressure plate. It is certainly better practice to renew the driven plate and pressure plate together, if finances permit.
5 Spin the release bearing in the clutch bellhousing and feel for roughness or shake. The bearing should be renewed without question unless it is known to be in perfect condition. For renewal see Section 7.

7 Clutch release mechanism – overhaul

1 With the gearbox removed from the engine, take the opportunity to inspect the clutch release arm, fork and bearing.
2 Remove the bearing from the fork. It is simply clipped in position. Any wear in the bearing, as described in Section 6, will necessitate its renewal. It is in any case, normal practice to renew the bearing during clutch renewal (photo).
3 Inspect the fork for wear, especially at its tips, and for cracks where it is welded to the shaft.
4 The removal of the shaft and release arm from the gearbox housing requires the use of a special adaptor which is screwed onto the threaded end of the release arm-to-shaft securing pin, which is then removed using a slide hammer (see Fig. 5.3).
5 If these tools are not available, the pin can be removed by cutting off the threaded portion of the pin using a junior hacksaw, then tapping the pin out with a pin punch and hammer. If the pin contacts the webbing on the gearbox housing, then cut through it again.
6 Once the pin is extracted, remove the release arm from the shaft.
7 The shaft can now be removed from the gearbox housing by lifting it up out of the bottom bush, then down out of the top bush and out of the housing.
Note: *As the release arm and shaft must be removed to renew the gearbox input shaft oil seal, it is worth considering renewal of the seal at this stage (see Chapter 6).*
8 Inspect the nylon bushes for wear and cracking and renew them as necessary. Before removing them, note their fitted positions and refit the new bushes in the same position (photos).
9 Apply a little Molykote BR2 Plus grease to the bushes, then fit the shaft/fork assembly to the housing, which is a reversal of removal (photos).

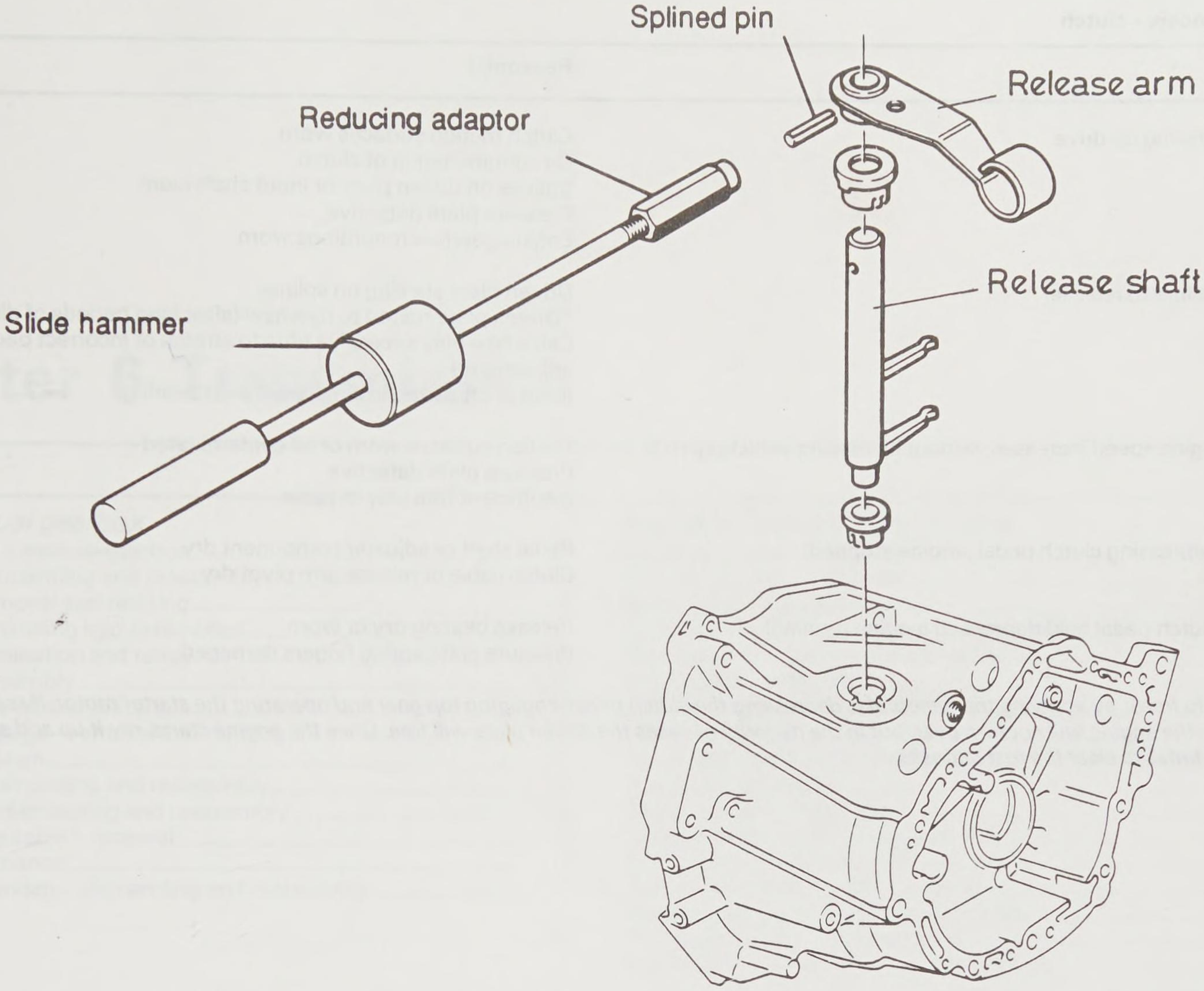
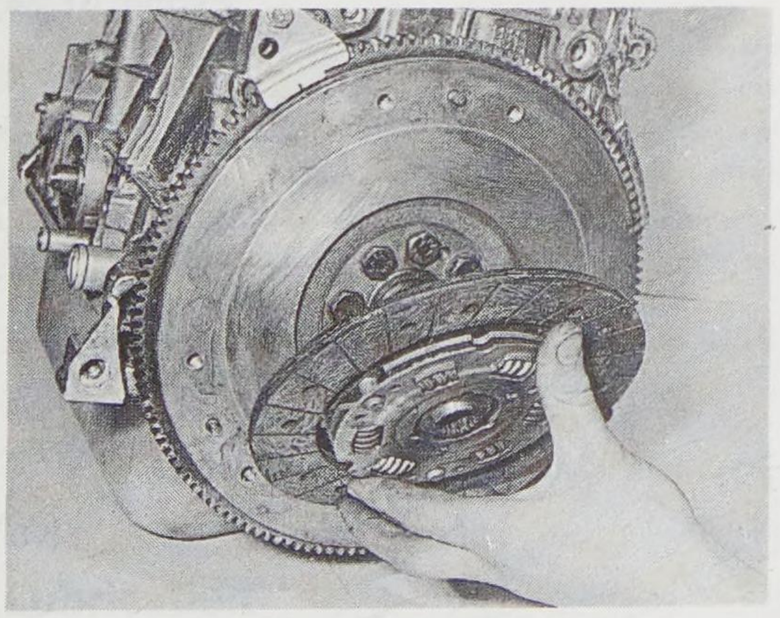


Fig 5.3 Release shaft and arm assembly showing slide hammer and adaptor (Sec 7)

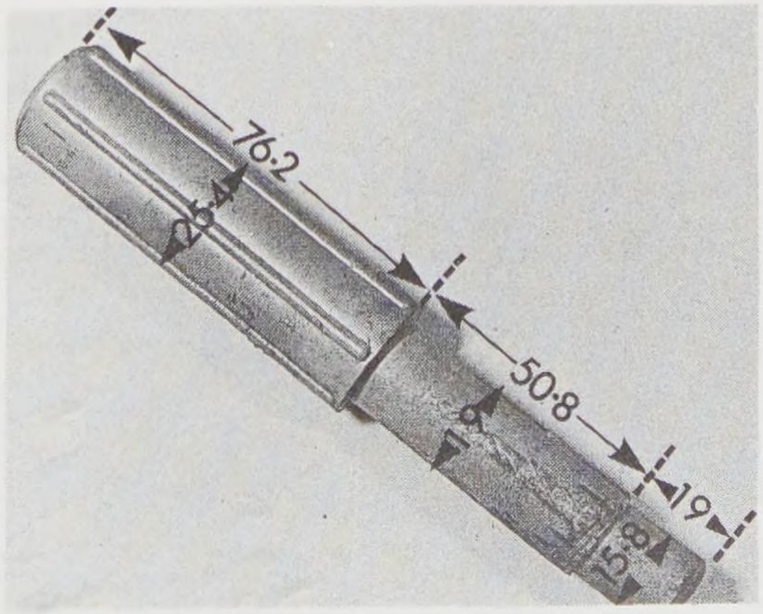
10 Fit the release arm to the shaft and knock in a new pin using a pin punch and hammer.
11 Apply a little Molykote grease to the input shaft splines, release bearing guide tube and the tips of the release fork.
12 Fit the release bearing to the fork.
13 Refit the gearbox as described in Chapter 6.

8 Clutch – refitting

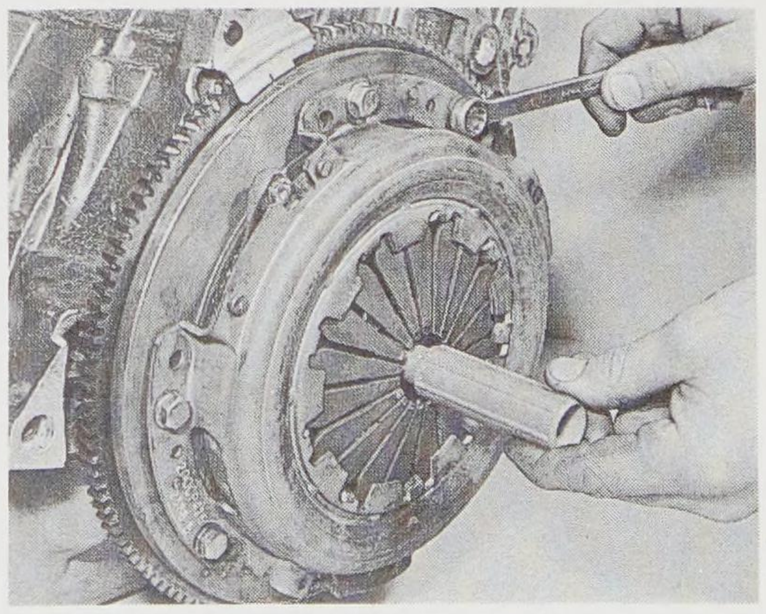
1 Position the driven plate on the flywheel with the spring hub facing outward (photo).
2 Locate the pressure plate over the driven plate and onto the dowels in the flywheel, also lining up the marks made during removal.
3 It is now necessary to line up the driven plate hub with the centre of the flywheel. This can be done using a purpose made clutch alignment tool, or, if the replacement clutch is Peugeot original equipment, a plastic dowel is supplied with the clutch for this purpose (photo). The dimensions of the plastic dowel are shown, so that a similar tool can be made from wooden dowel if neither of the aforementioned tools are available.
4 Place the dowel through the pressure plate, pick up the driven plate, and push the dowel through into the flywheel hub (photo).
5 Tighten the pressure plate bolts evenly and diagonally to the specified torque. Remove the dowel.
Note: *If the clutch driven plate is not precisely aligned the gearbox input shaft will not enter the flywheel hub on refitting.*
6 Refit the gearbox as described in Chapter 6.



8.1 Positioning the driven plate on the flywheel



8.3 Clutch alignment tool (all dimensions in mm)



8.4 Using clutch alignment tool to line up driven plate

9 Fault diagnosis – clutch

Symptom	Reason(s)
Judder when taking up drive	Clutch friction surfaces worn Oil contamination of clutch Splines on driven plate or input shaft worn Pressure plate defective Engine/gearbox mountings worn
Clutch drag (failure to release)	Driven plate sticking on splines *Driven plate rusted to flywheel (after long periods of disuse) Cable free play excessive (due to stretch or incorrect pedal travel adjustment) Input shaft seized in crankshaft pilot bearing
Clutch slip (engine speed increases without increasing vehicle speed)	Friction surfaces worn or oil contaminated Pressure plate defective Insufficient free play in cable
Noise when depressing clutch pedal (engine stopped)	Pedal shaft or adjuster component dry Clutch cable or release arm pivot dry
Noise when clutch pedal held depressed (engine running)	Release bearing dry or worn Pressure plate spring fingers damaged

**It is possible to free it by applying the handbrake, depressing the clutch pedal, engaging top gear and operating the starter motor. If really badly corroded, then the engine will not turn over, but in the majority of cases the driven plate will free. Once the engine starts, rev it up and slip the clutch several times to clear the rust deposits.*

Chapter 6 Transmission

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Specifications

Part A: Manual gearbox

General

Type	Five forward speeds, all synchromesh, one reverse gear
Designation	BE1/5

Gear ratios

All models except Mi 16:	
1st	3.25:1
2nd	1.85:1
3rd	1.28:1
4th	0.97:1
5th	0.76:1
Reverse	2.58:1
Mi 16 models:	
1st	2.37:1
2nd	1.85:1
3rd	1.28:1
4th	0.96:1
5th	0.75:1
Reverse	2.58:1
Final drive ratios:	
1.6 carburettor models	4.187:1
1.9 carburettor models	4.063:1
1.9 fuel injection models except Mi 16	4.062:1
Mi 16 models	4.42:1

Lubrication

Oil capacity (including final drive unit)	2.0 litres (3.52 pints)
Lubricant type/specification	Gear oil, viscosity 75W/80W, to API GL5 (Duckhams Hypoid PT 75W/80)

Torque wrench settings

	Nm	lbf ft
Gearbox rear cover bolts	12.5	9
Input shaft nut	55	41
Output shaft nut	55	41
Output shaft bearing retaining bolts	15	11
Reverse shaft locking plate bolt	15	11
Gearbox casing bolts	12.5	9
Reverse idler shaft retaining bolt	20	15
Selector lever spring bracket	15	11
Reversing lamp switch	25	18
Gearbox drain plug	30	22
Speedometer drive locking bolt	12.5	9
Final drive casing extension housing	15	11
Crown wheel-to-cage bolts	65	48
Final drive casing:		
10 mm bolts	40	30
7 mm bolts	12.5	9
Release bearing guide tube bolts	12.5	9
Gearbox filler/level plug	20	15

Part B: Automatic transmission

General

Make	ZF
Type	4HP14
Number of speeds	Four forward, one reverse

Gear ratios

1st	2.78:1
2nd	1.57:1
3rd	1.15:1
4th	0.85:1
Reverse	3.27:1

Lubrication

Fluid type/specification	Dexron II ATF (Duckhams D-Matic)
Capacity:	
Total (including torque converter)	6.2 litres (11.0 pints)
Drain and refill (gearbox and final drive)	2.4 litres (4.2 pints)

Change speeds (in mph)

Change speeds are variable depending on position of accelerator pedal and vehicle speed

	Gear selection					
Pedal position:	1-2	2-3	3-D	D-3	3-2	2-1
Light opening	9-10	26-28	39-42	34-37	23-26	8-9
Heavy depression	26-29	45-50	70-85	60-67	42-47	23-26
Kickdown	34-37	62-63	83-96	74-88	59-64	31-34

Torque wrench settings

	Nm	lbf ft
Double function switch	40	30
Heat exchanger securing bolt	50	37
Dipstick tube nut	45	33
Sump bolts	10	7
Side cover bolts	10	7
Transfer shaft bearing retaining bolts	20	15
Filter casing bolts (small head)	6	4
Filter casing bolts (large head)	8	6
Hydraulic block bolts	8	6
Selector cable-to-gearbox bolts	30	22
Selector lever-to-gearbox nut	30	22

PART A: MANUAL GEARBOX

1 General description

The BE1/5 gearbox is a five-speed, all synchromesh unit with integral final drive. Drive is transmitted to the front wheels by the driveshafts, whose splined ends locate in either side of the final drive unit.

As is common practice with five-speed gearboxes, the fifth gear is housed in a bolt-on extension to the gearbox, the input shaft being extended through an intermediate plate to carry the 5th gear components.

Gear selection is by control rod and links from a floor-mounted gear lever. Inadvertent selection of reverse is prevented by a reverse release plunger, operated by cable from the gear lever.

The gearbox and final drive share a common filler plug, drain plug and lubricant.

Speedometer drive is taken from a pinion mounted on the right-hand side of the final drive unit.

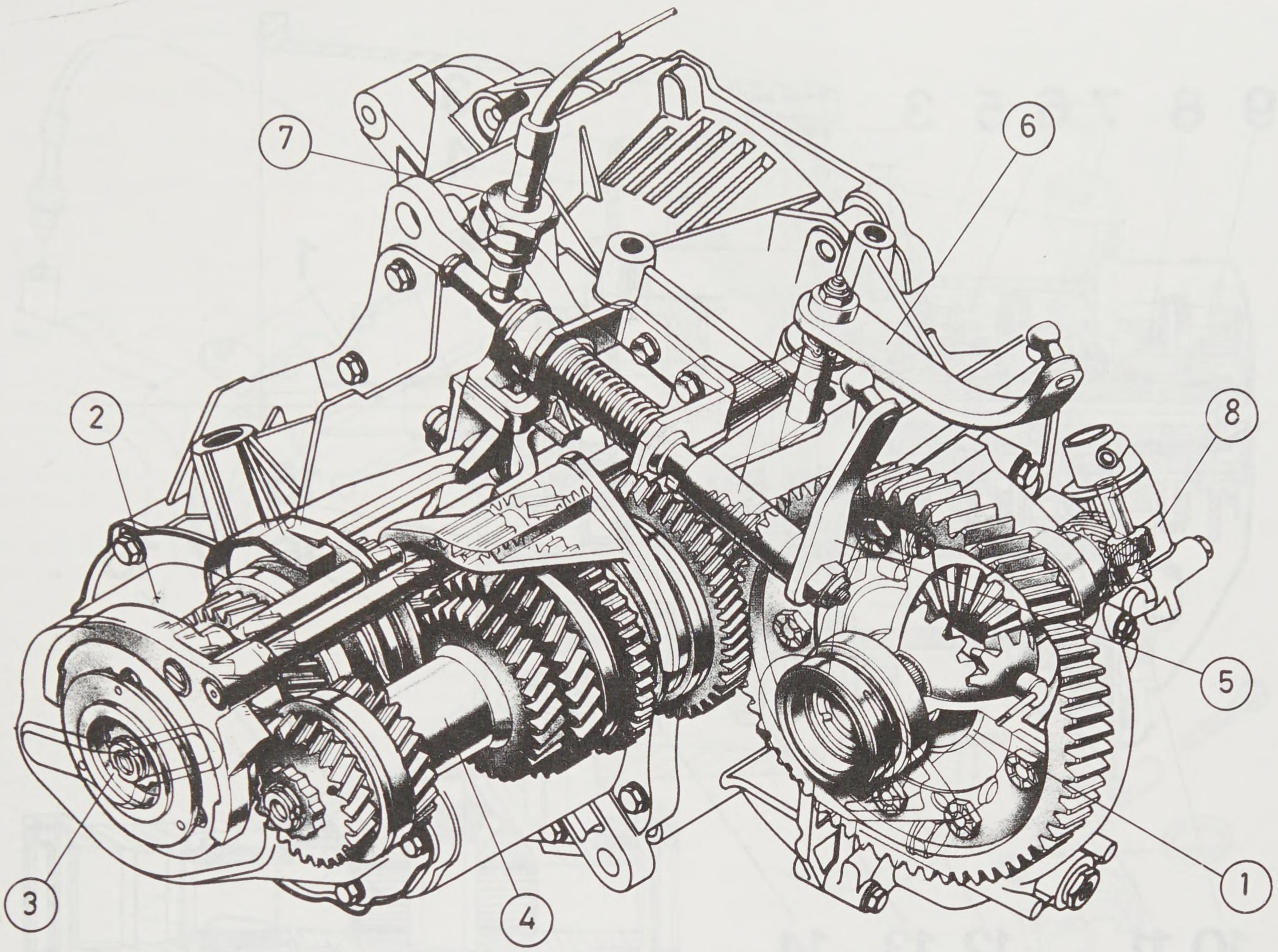


Fig 6.1 Cutaway view of the BE 1/5 gearbox (Sec 1)

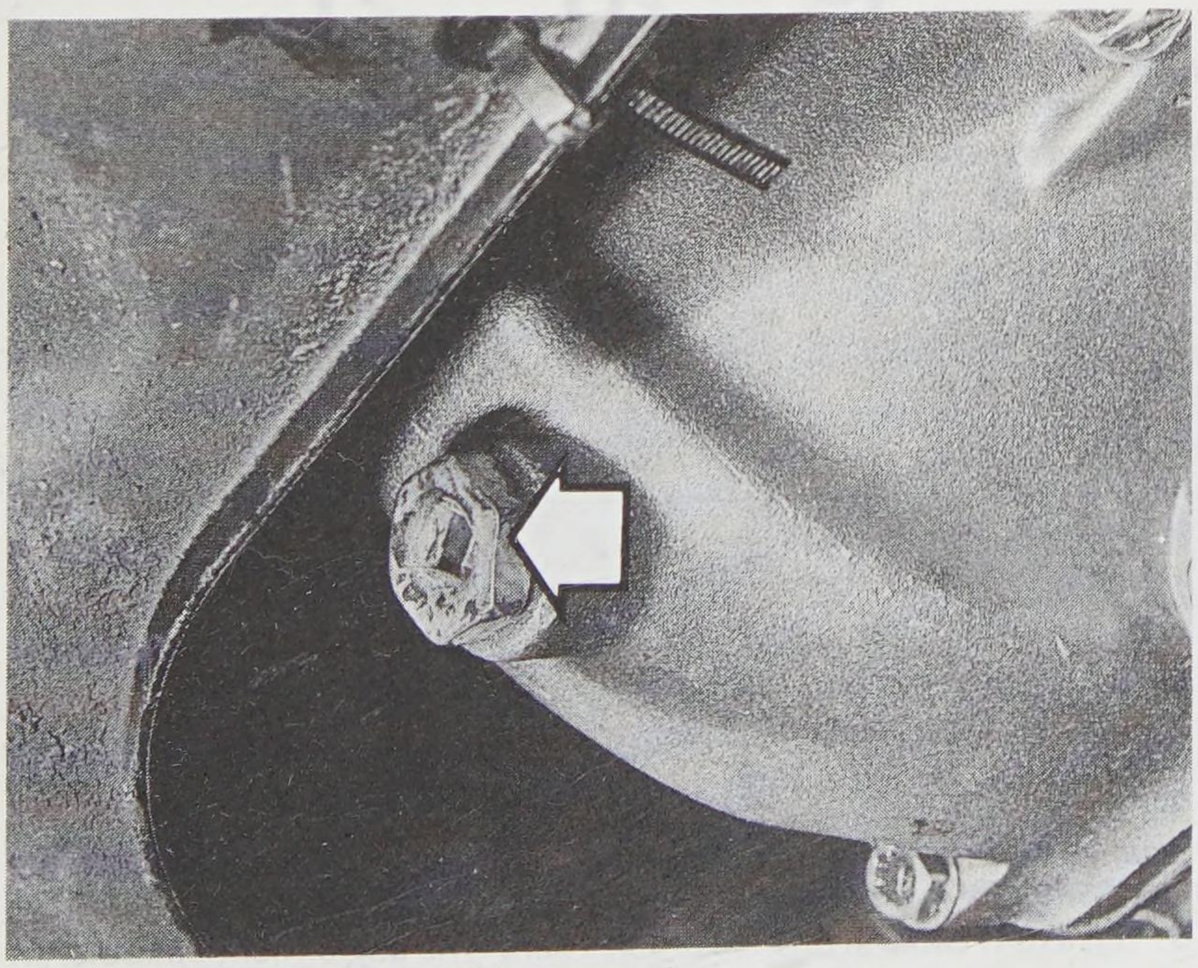
1 Final drive unit
2 5th gear housing
3 Input shaft
4 Output shaft
5 Engagement lever/shaft
6 Selector cover/shaft
7 Reverse release plunger
8 Speedometer drive housing

2 Routine maintenance

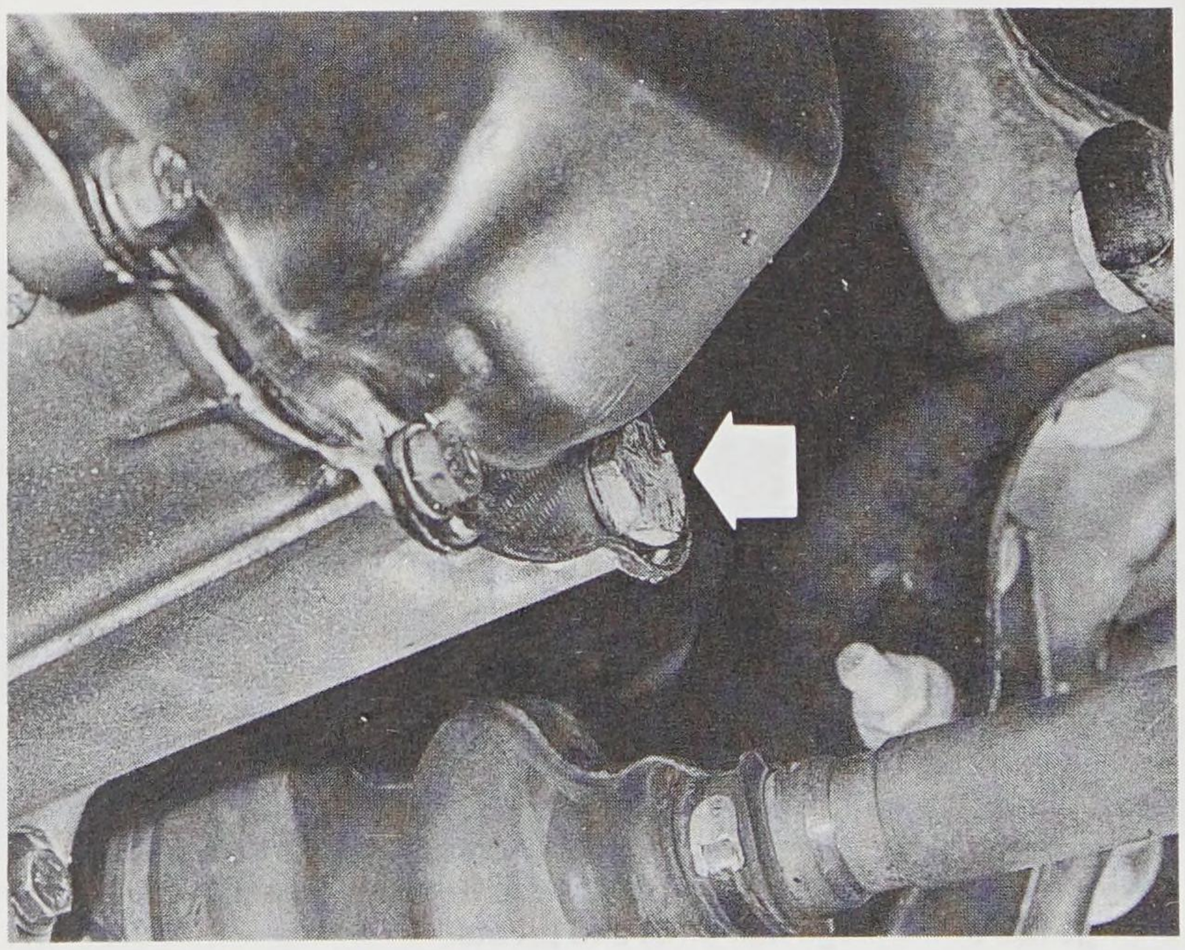
At the intervals laid down in the 'Routine maintenance' *Section at the beginning of this manual, carry out the following operations.*

Note: *There is no requirement to renew the oil in the BE1/5 gearbox, but if this becomes necessary, proceed as follows*

1 Place a suitable container below the gearbox drain plug. Remove the drain plug (photo) and allow the oil to drain into the container. The oil will drain more efficiently if it is warm (ie, after the car has been run).



2.1 Gearbox drain plug (arrowed)



2.3 Gearbox filler/level plug (arrowed)

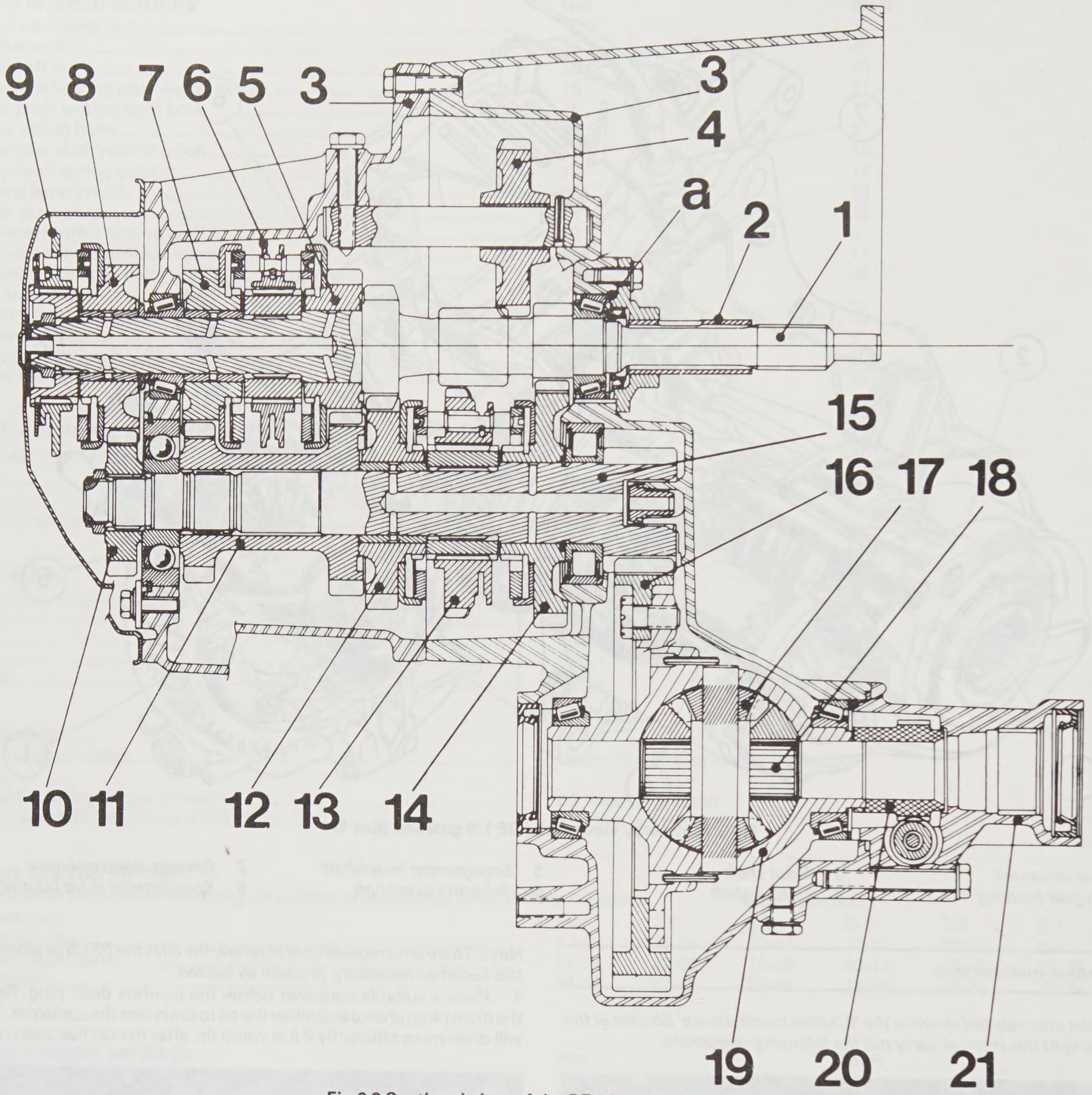


Fig 6.2 Sectional view of the BE 1/5 gearbox (Sec 1)

1 Input shaft
2 Release bearing guide tube
3 Casings
4 Reverse idler gear
5 3rd gear (driving)
6 3rd/4th synchro
7 4th gear (driving)
8 5th gear (driving)
9 5th synchro
10 5th gear (driven)
11 3rd/4th gears (driven)
12 2nd gear (driven)
13 1st/2nd synchro
14 1st gear (driven)
15 Output shaft
16 Crownwheel
17 Differential gear
18 Side gear
19 Differential carrier
20 Speedo driving gear
21 Extension housing
a Selective shim – input shaft bearing preload

2 Clean the drain plug and fit a new sealing washer to it. When all the oil has drained out of the gearbox, refit the drain plug and tighten it to the specified torque.
3 Remove the filler/level plug (photo) and insert the tube of the new oil bottle into the hole, then squeeze in the specified grade and quantity of oil.
4 On completion, fit a new washer to the filler/level plug and fit and tighten the plug to the specified torque.
5 Take the vehicle for a short run, and check for leaks on return.
6 At the same time, apply a little lithium-based grease to the gear-change rod and linkage ball-ends and pivots.

3 Reverse release cable – renewal

1 Disconnect the cable at the gearbox end by unscrewing the plastic nut and withdrawing the release plunger (photos).
2 Remove the centre floor console as described in Chapter 11, Section 37.
3 Disconnect the cable from the gear lever by unhooking it from its location on the gear lever (photo).
4 Withdraw the cable into the engine bay.
5 Fit a new cable in reverse order. There is no adjustment possible. (In

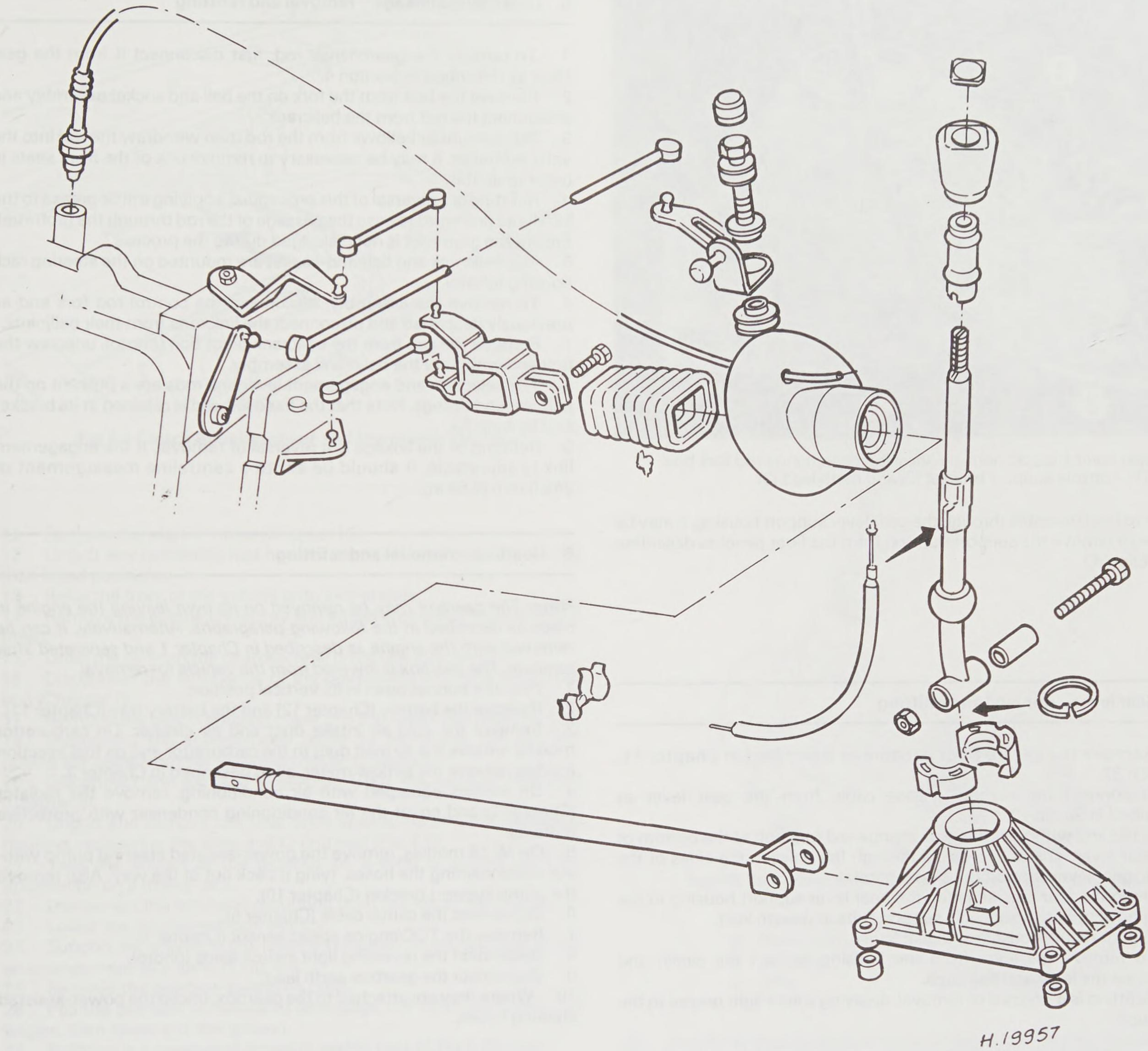
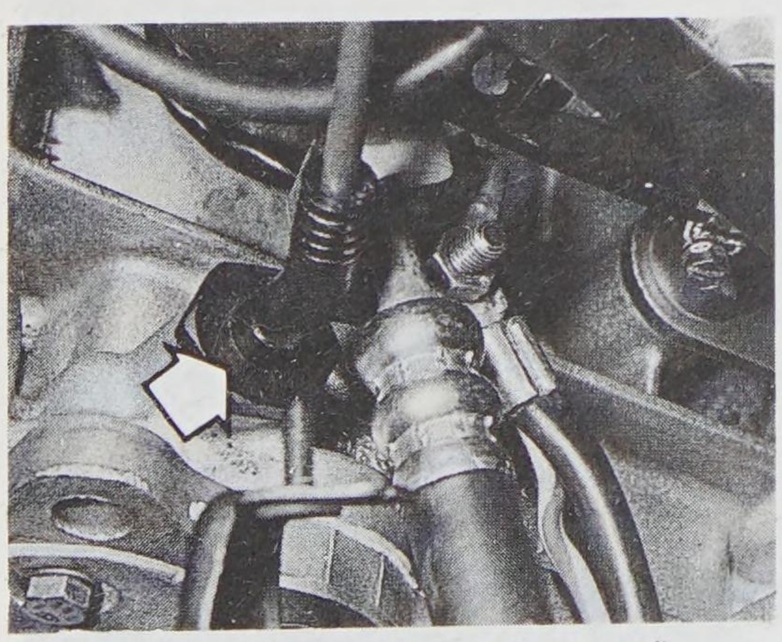
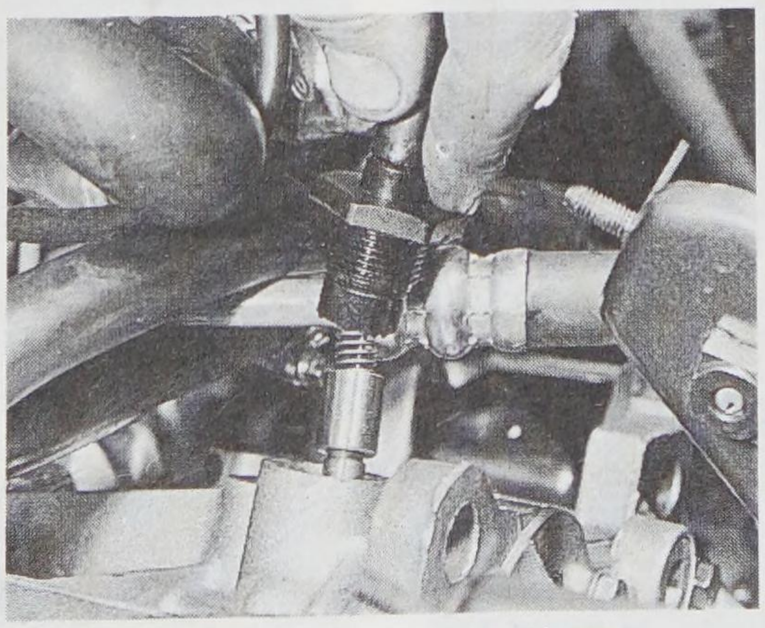


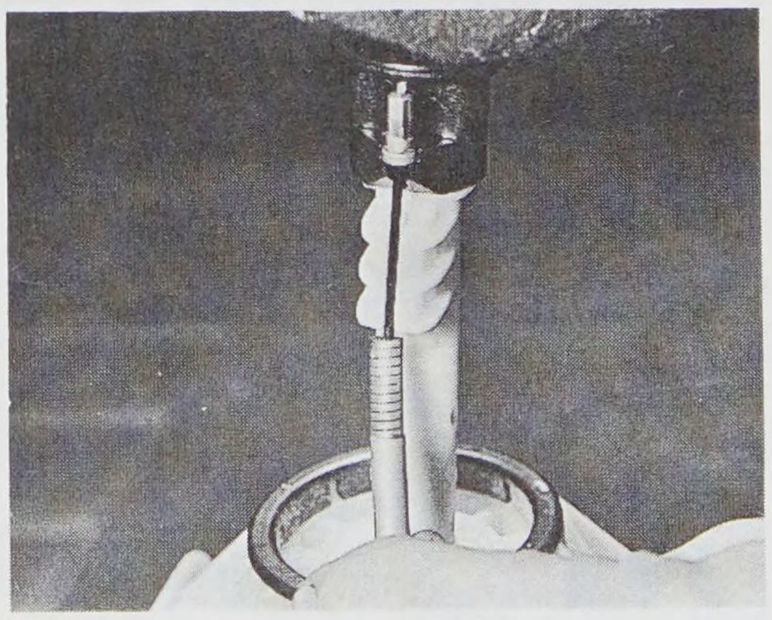
Fig 6.3 Gearchange linkage, gear lever and reverse release cable (Secs 3, 4 and 5)



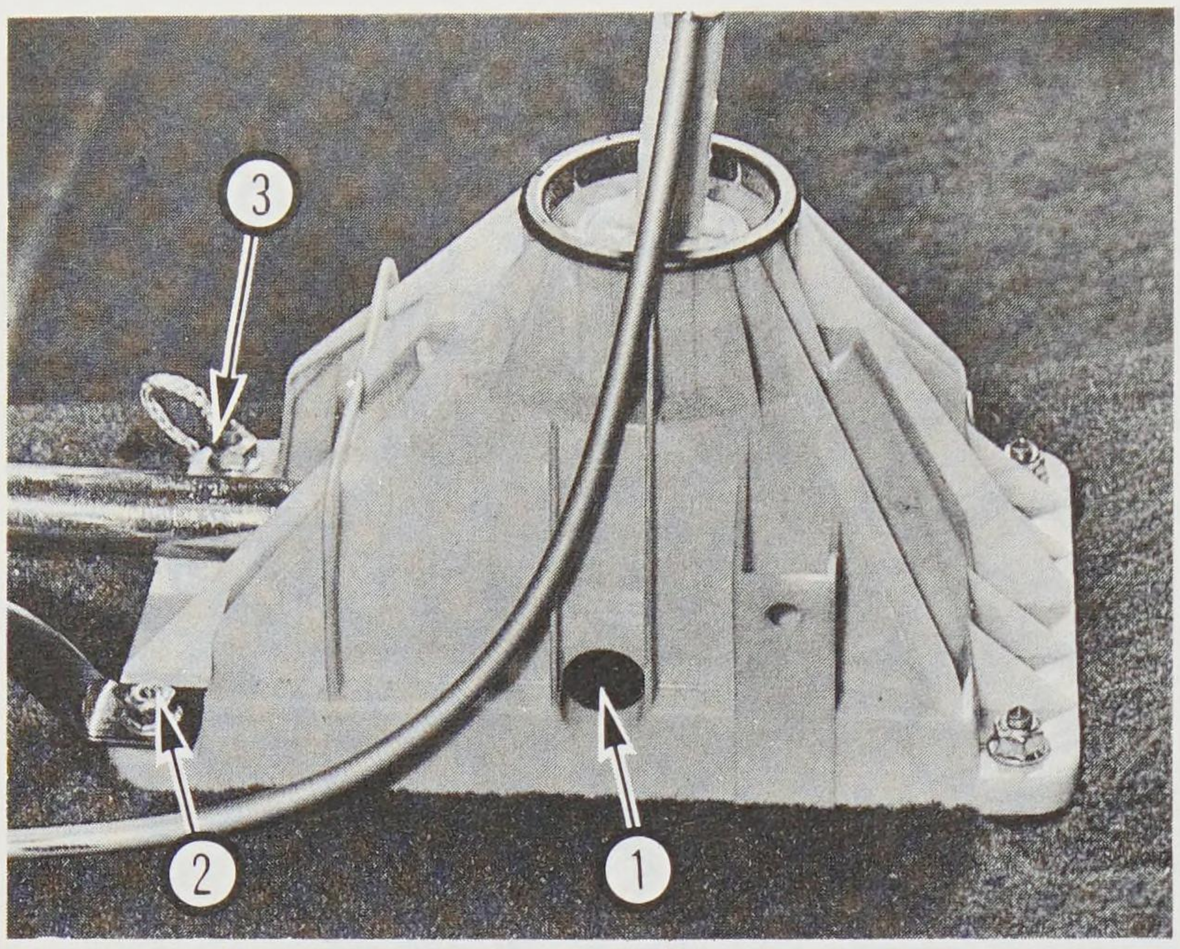
3.1A Reverse release plunger (arrowed)



3.1B Withdrawing the reverse release plunger



3.3 Reverse release cable at gear lever end

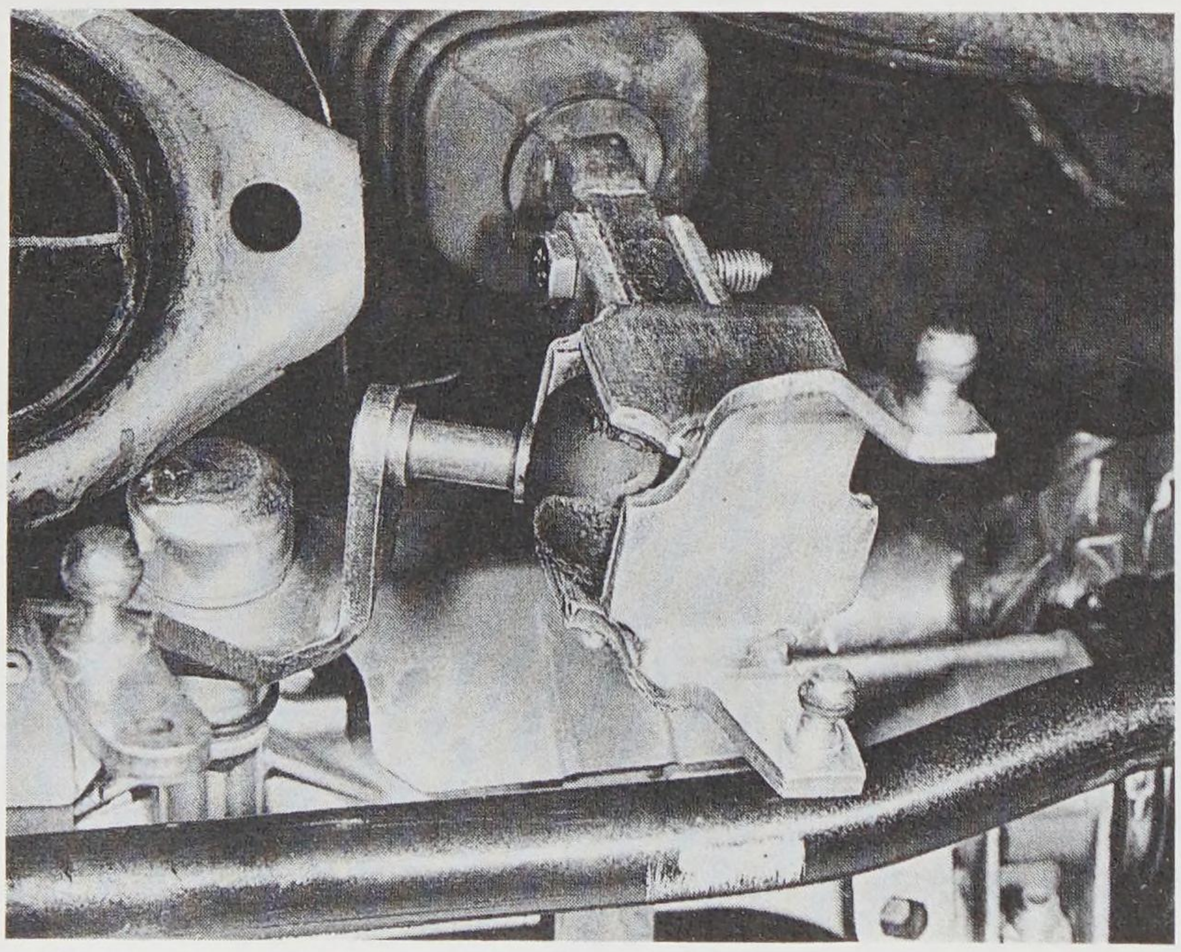


4.3 Gear lever support housing showing gearchange rod fork bolt hole (1), console support bracket (2) and earth lead (3)

order to feed the cable through the gear lever support housing, it may be easier to remove the support housing from the floor panel as described in Section 4.)

4 Gear lever – removal and refitting

1 Remove the centre floor console as described in Chapter 11, Section 37.
2 Disconnect the reverse release cable from the gear lever as described in Section 3.
3 Undo and withdraw the gear change rod fork bolt at the bottom of the gear lever. This is accessible through the holes in the sides of the plastic gear lever support housing (photo).
4 Undo the four nuts securing the gear lever support housing to the floor panel, noting the console support tube and earth lead.
5 Withdraw the housing and gear lever.
6 To remove the lever from the housing, extract the circlip and withdraw the lever and ball cups.
7 Refitting is a reversal of removal, applying a little light grease to the ball cups.



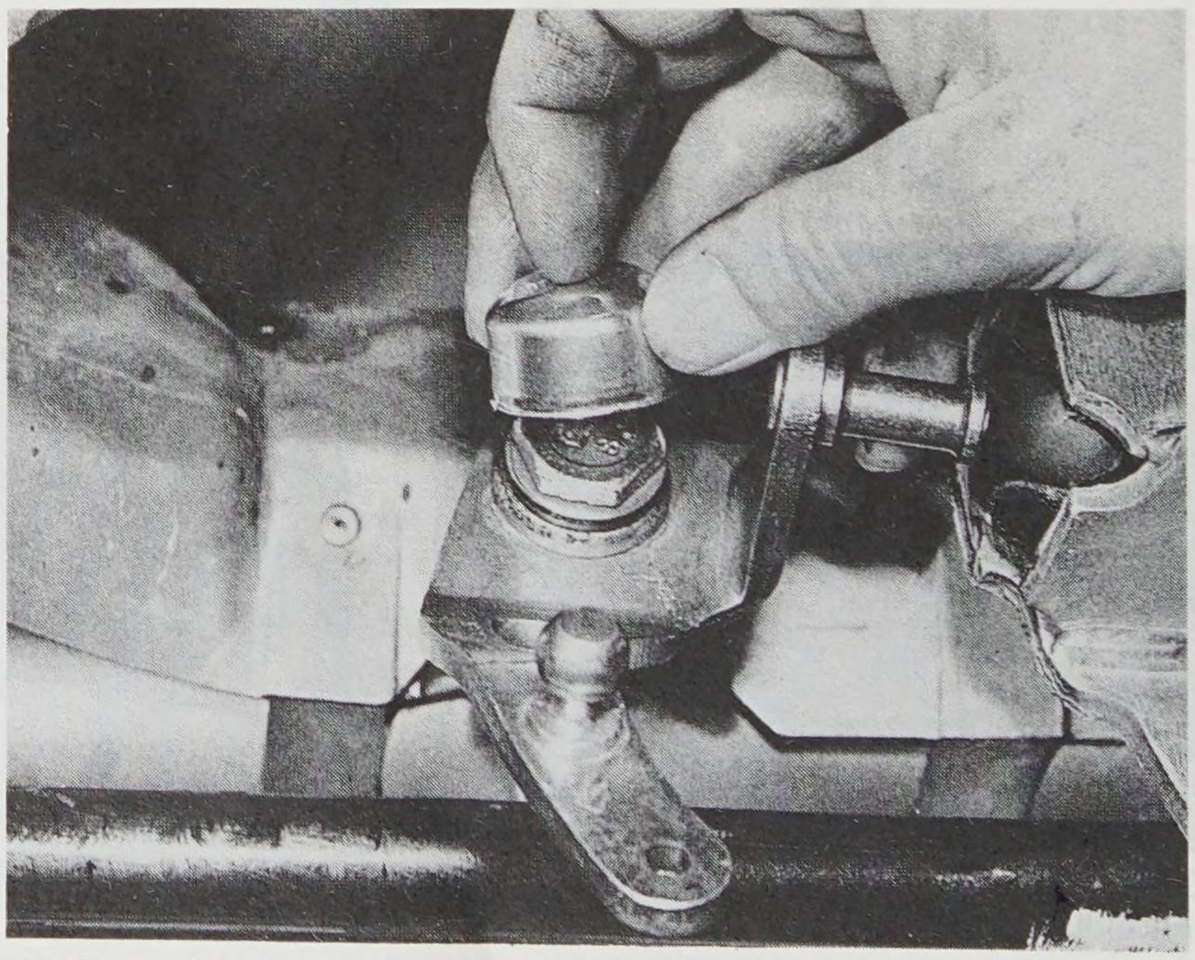
5.5 Bellcrank and ball-and-socket assembly

5 Gearchange linkage – removal and refitting

1 To remove the gearchange rod, first disconnect it from the gear lever as described in Section 4.
2 Remove the bolt from the fork on the ball and socket assembly and disconnect the rod from the bellcrank.
3 Pull the rubber bellows from the rod then withdraw the rod into the vehicle interior. It may be necessary to remove one of the front seats in order to do this.
4 Refitting is a reversal of this procedure, applying a little grease to the bulkhead grommet to ease the passage of the rod through the grommet. Ensure the grommet is not dislodged during the process.
5 The bellcrank and ball-and-socket are mounted on the steering rack housing (photo).
6 To remove the assembly, disconnect the control rod fork end as previously described and disconnect the link rods from their balljoints.
7 Remove the cap from the bellcrank pivot bolt (photo), unscrew the bolt and withdraw the bellcrank assembly.
8 The selection and engagement lever link rods are a push-fit on the balljoint end fittings. Note that the fixed link rod is retained at its bracket end by a circlip.
9 Refitting of the linkage is a reversal of removal. If the engagement link is adjustable, it should be set to a centreline measurement of 246.0 mm (9.69 in).

6 Gearbox – removal and refitting

Note: *The gearbox may be removed on its own leaving the engine in place as described in the following paragraphs. Alternatively, it can be removed with the engine as described in Chapter 1 and separated after removal. The gearbox is lowered from the vehicle for removal.*
1 Prop the bonnet open in its vertical position.
2 Remove the battery (Chapter 12) and the battery tray (Chapter 11).
3 Remove the cold air intake duct and air cleaner. On carburettor models remove the air inlet duct to the carburettor and on fuel injection models remove the airflow meter, all as described in Chapter 3.
4 On models equipped with air conditioning, remove the radiator (Chapter 2) and cover the air conditioning condenser with protective material.
5 On Mi 16 models, remove the power-assisted steering pump without disconnecting the hoses, tying it back out of the way. Also remove the pump support bracket (Chapter 10).
6 Disconnect the clutch cable (Chapter 5).
7 Remove the TDC/engine speed sensor (Chapter 4).
8 Disconnect the reversing light switch leads (photo).
9 Disconnect the gearbox earth lead.
10 Where they are attached to the gearbox, unclip the power-assisted steering hoses.



5.7 Removing the cap from the bellcrank pivot bolt

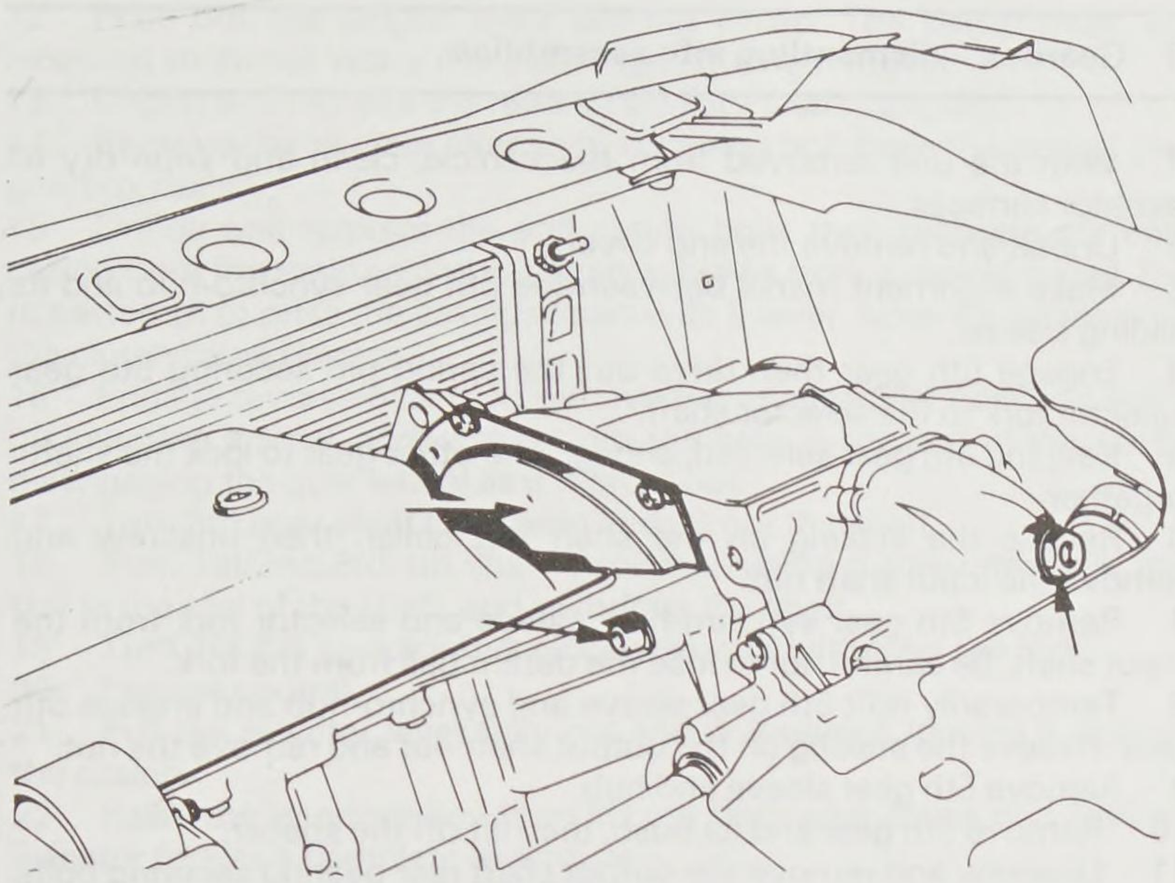


Fig 6.4 Clutch housing cover and lower bolt (Sec 6)

11 Remove the starter motor (Chapter 12).
12 Unbolt any remaining fuel hose or electrical lead brackets, noting their fitted positions.
13 Raise the front of the vehicle onto axle stands.
14 Remove the engine undertray and wheel arch lower mud shield, if fitted.
15 Drain the oil from the gearbox/final drive unit (Section 2).
16 Disconnect the inner ends of the driveshafts from the final drive unit (Chapter 7).
17 Remove the clutch housing cover and the lower bolt (see Fig. 6.4).
18 Disconnect the speedometer cable by extracting the pin and pulling the cable from the extension housing (photos).
19 Disconnect the exhaust downpipe from the exhaust manifold (Chapter 3).
20 Unbolt and remove the final drive speedometer drive extension housing, recovering the shim and O-ring seal (Fig. 6.5).
21 Take the weight of the gearbox on a sling or support it from underneath on a trolley-jack.
22 Disconnect the left-hand mounting from the top of the gearbox.
23 Lower the engine/gearbox slightly.
24 Support the engine in this lowered position on another jack or use an arrangement as shown in Fig. 6.6.
25 Remove the gearbox-to-engine bolts.
26 Pull the gearbox outwards to disengage the input shaft from the engine, then lower it to the ground.
27 Refitting is a reversal of removal, taking note of the following.
28 Coat the input shaft splines, release bearing sleeve and release fork ends with Molycote BR2 grease.
29 If disturbed, adjust the gearchange links as described in Section 5.
30 Use new nyloc nuts where they are fitted.
31 Fit a new O-ring seal to the speedometer housing and new driveshaft seals in the final drive unit.

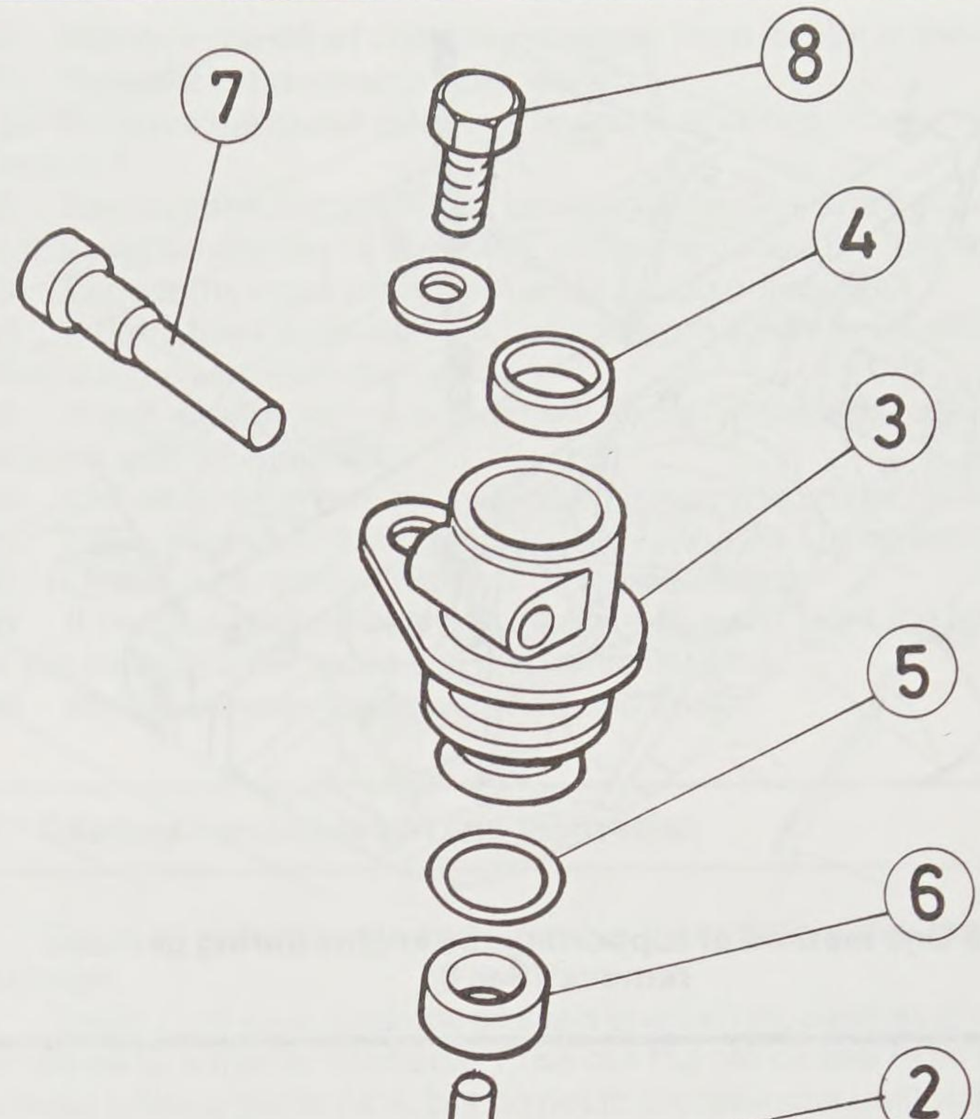
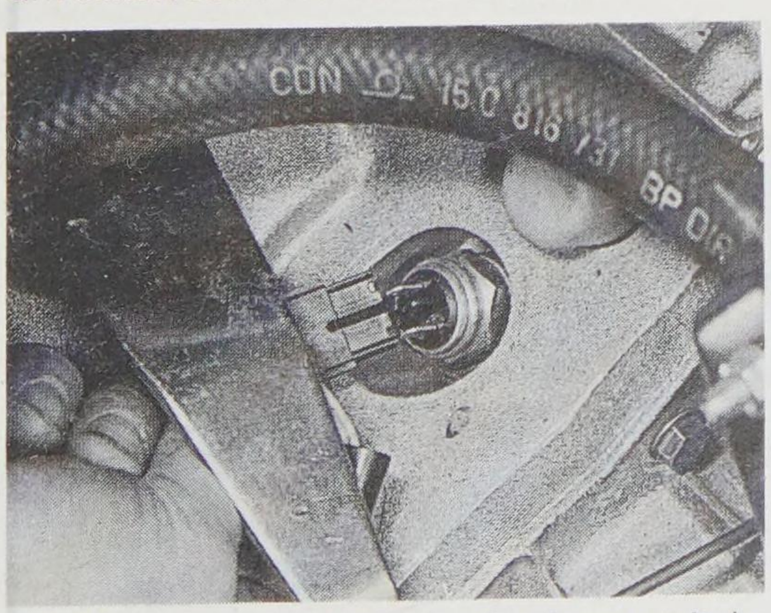


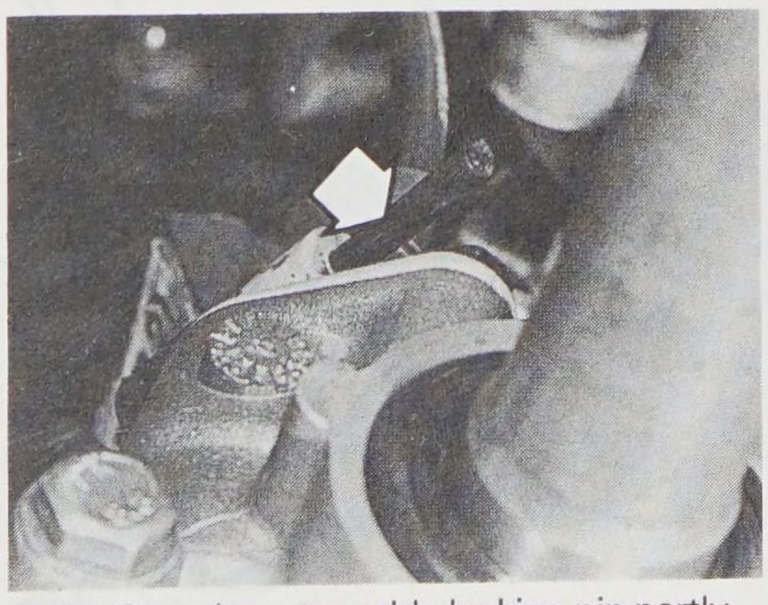
Fig 6.5 Components of the speedometer drive (Sec 6)

1	*Drive gear*	5	*O-ring seal*
2	*Drive pinion*	6	*Ring*
3	*Housing*	7	*Locking pin*
4	*Ring*	8	*Locking bolt*

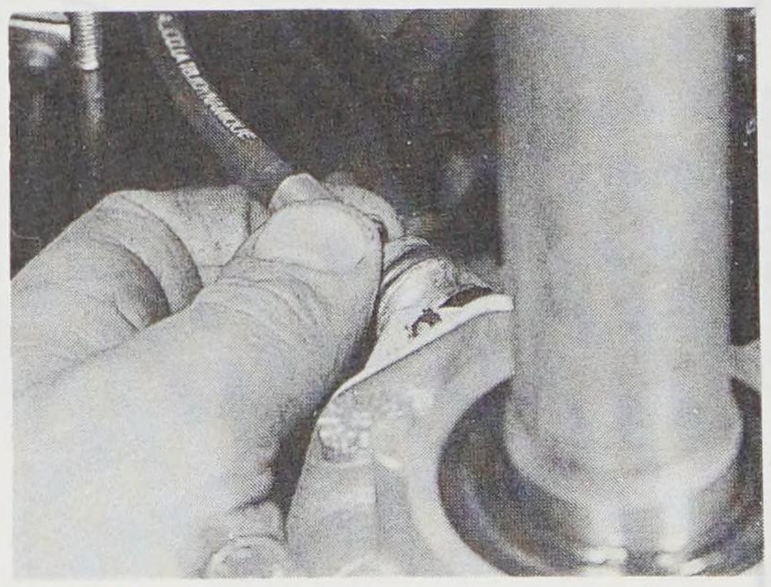
32 On Mi 16 models tension the power-assisted pump drivebelt as described in Chapter 10.
33 On completion, fill the gearbox/final drive unit with oil as described in Section 2.
Note: *If a new clutch housing is being fitted to Mi 16 models with Motronic ignition, refer to Chapter 1, Section 30 (on flywheel/toothed rotor overhaul) for setting of the TDC sensor air gap.*



6.8 Disconnecting the reversing lamp switch leads



6.18A Speedometer cable locking pin partly withdrawn (arrowed)



6.18B Pulling out the speedometer cable

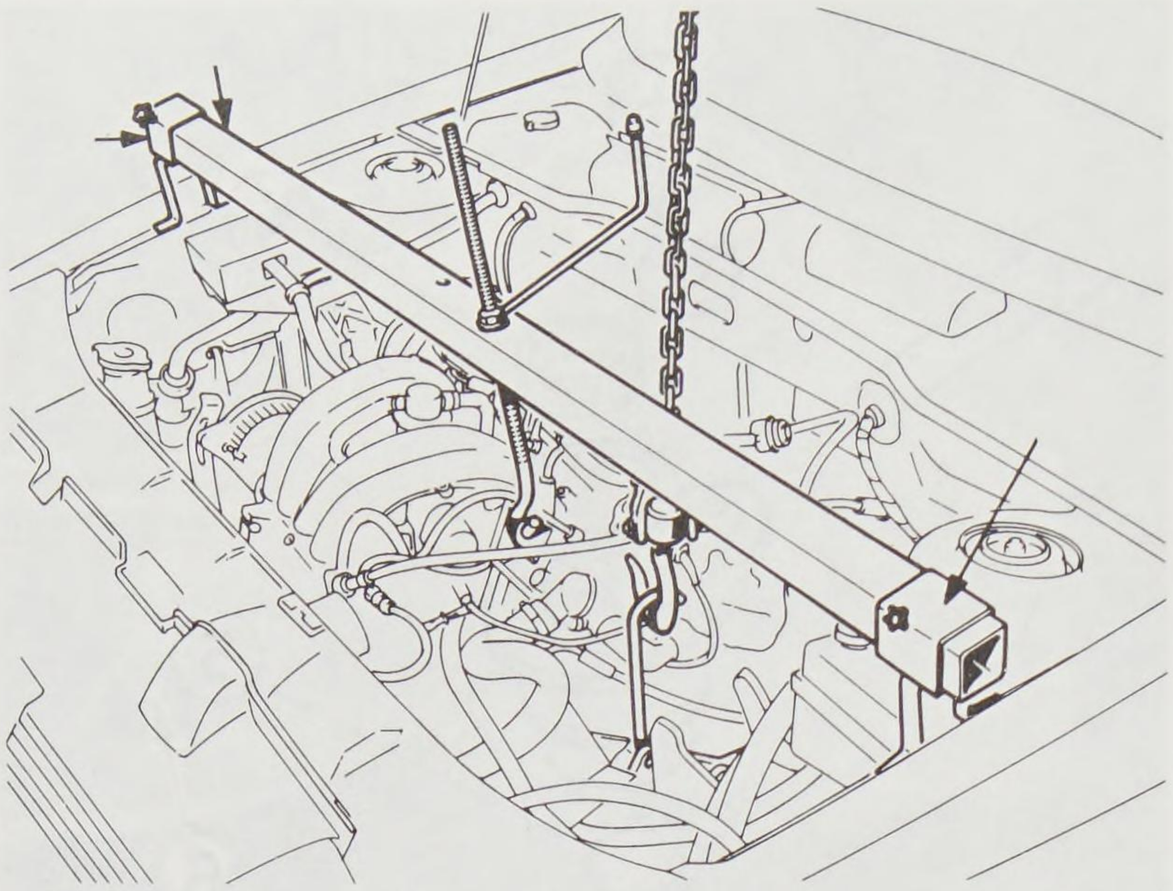


Fig 6.6 One method of supporting the engine during gearbox removal (Sec 6)

7 Gearbox – dismantling into assemblies

1 With the unit removed from the vehicle, clean and wipe dry all exterior surfaces.
2 Unbolt and remove the end cover.
3 Make alignment marks between the 5th gear synchro-hub and its sliding sleeve.
4 Engage 5th gear then drive out the spring pin securing 5th gear selector fork to the selector shaft.
5 Keeping 5th gear selected, engage one other gear to lock the shafts together.
6 Relieve the staking on the shaft nut collar, then unscrew and remove the input shaft nut.
7 Remove 5th gear synchro-hub, sleeve and selector fork from the input shaft. Be careful not to lose the detent ball from the fork.
8 Temporarily refit 5th gear sleeve and synchro-hub and engage 5th gear. Relieve the staking on the output shaft nut and remove the nut.
9 Remove 5th gear sleeve and hub.
10 Remove 5th gear and its bush, then lift off the spacer.
11 Unscrew and remove the output shaft rear bearing securing bolts and washers.

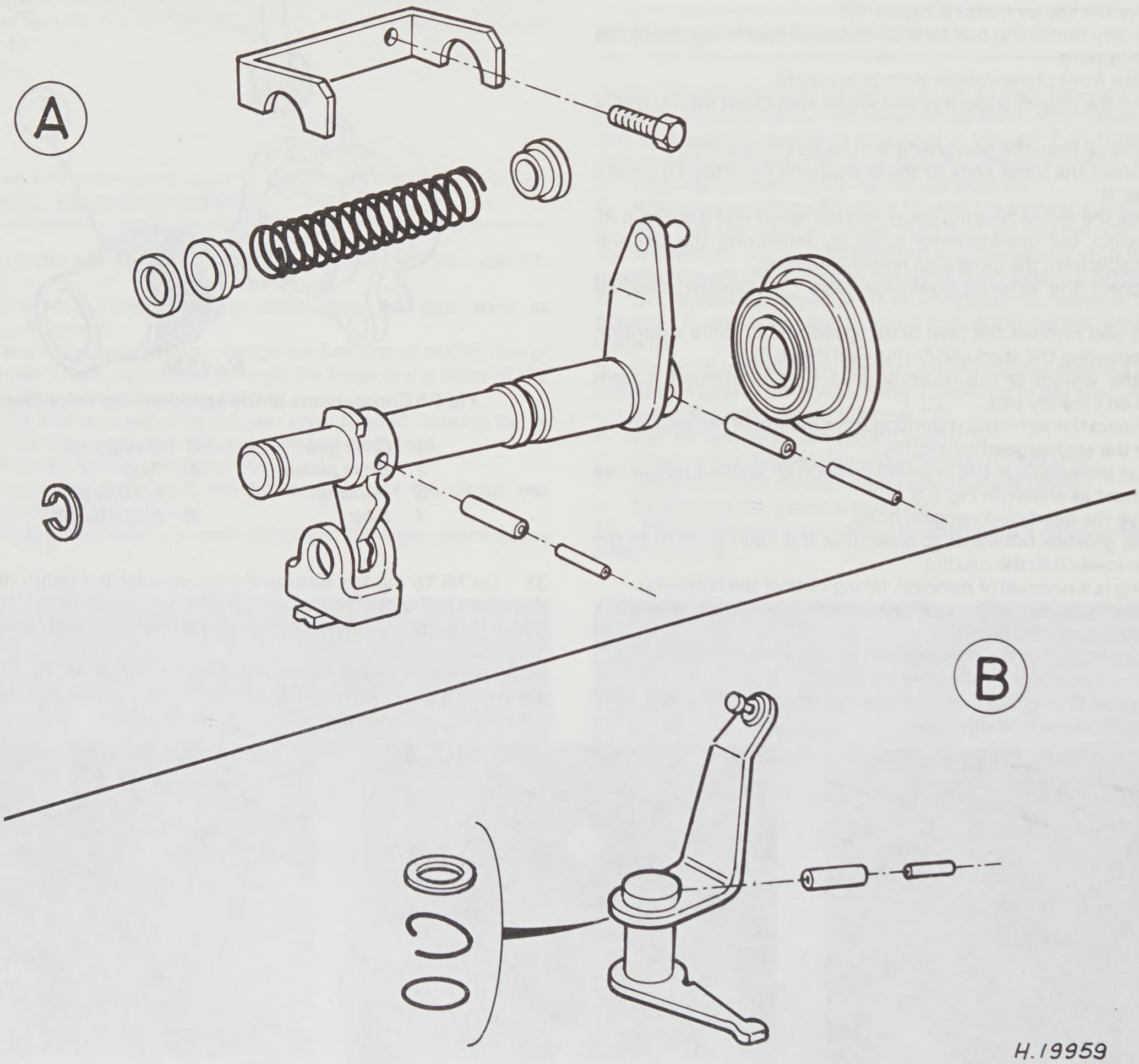
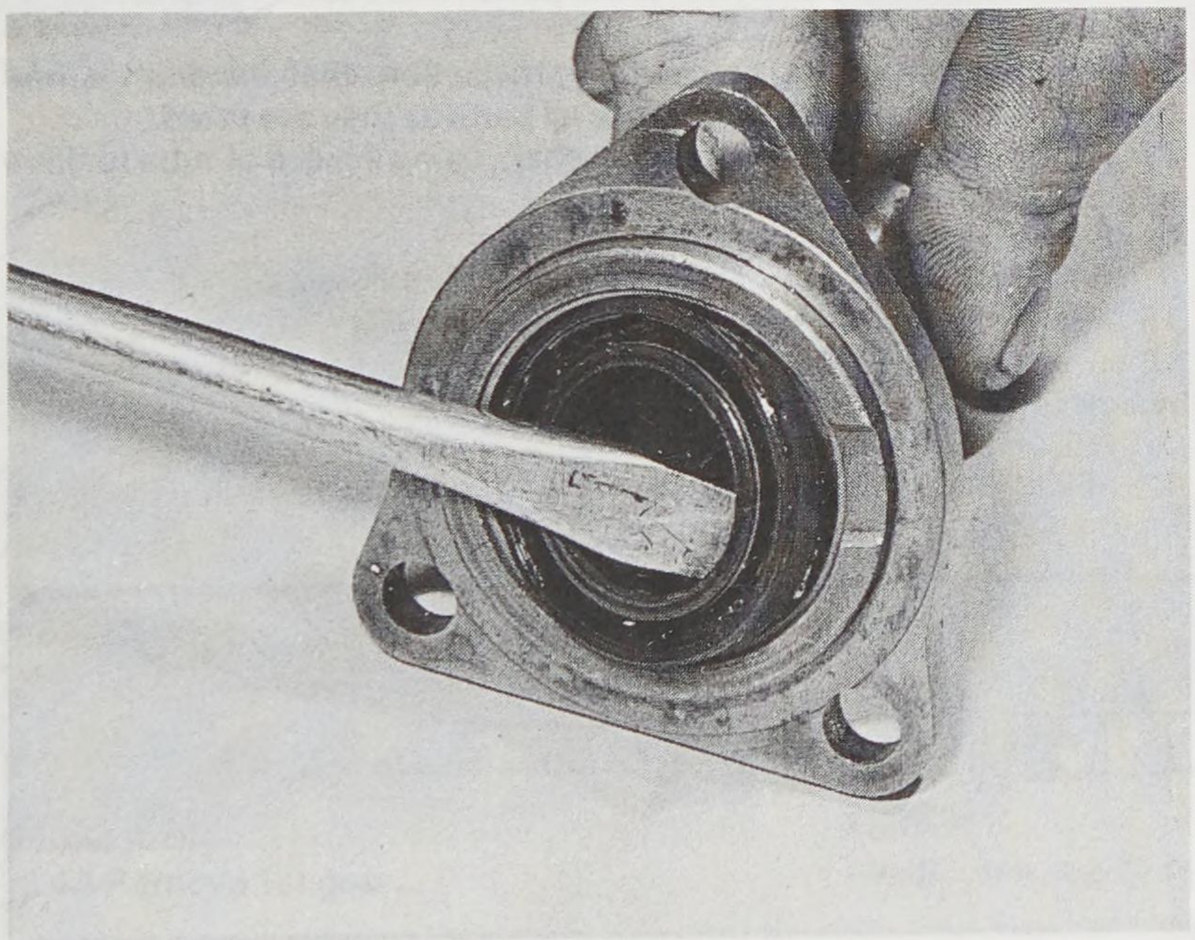


Fig 6.7 Exploded view of the selector lever (A) and engagement lever (B) (Sec 7)

12 Prise out the output shaft bearing circlip. The circlip must be renewed so do not worry if it is damaged during removal.
13 Unbolt and remove the reverse selector shaft lockplate.
14 Remove the reverse idler shaft retaining bolt from the side of the gearbox casing.
15 Unbolt and remove the end casing bolts then separate the end casing from the main casing with gentle blows from a plastic mallet. Do not attempt to prise the casings apart with a lever. Note the position of the clutch cable bracket.
16 Engage reverse gear then remove the reverse idler gear and shaft by inserting a small screwdriver into the hole in the end of the shaft, disengaging the gear wheel as it is lifted out.
17 Turn 5th gear shaft clockwise and lift out the shaft.
18 Turn 1st/2nd-3rd/4th shaft clockwise using a screwdriver in the slot in the end of the shaft, and withdraw the shaft.
19 Turn 3rd/4th selector fork clockwise, and withdraw the fork.
20 Engage neutral.
21 Pull the selector lever fully out and downward, locking it against the casing.
22 Raise the interlock key then lift out both gear trains and 1st/2nd selector fork as a complete assembly.
23 Drift out the spring pin from the engagement lever.
24 Pull the lever from the engagement shaft and recover the spring, washer and seal.
25 Release the selector lever then push the engagement shaft inward to disengage its finger from the cut-out in the selector shaft, then remove the selector shaft and lever.
26 Recover the interlock key, selector finger, spacer, spring and washers.
27 Unbolt and remove the selector shaft spring bracket.
28 Undo the nut on the outside of the casing then remove the reverse selector lever and lift out the reverse release plunger and spring.
29 Remove the swarf collecting magnet from its slot in the casing.
30 Remove the reversing lamp switch.
31 Remove the clutch release arm and fork as described in Chapter 5, Section 7.
32 Remove the clutch release bearing guide tube and prise out the oil seal, being careful not to score the seal bore in the tube (photo).
33 Extract the input shaft shim and bearing outer race.
34 If there have been signs of leakage from the selector shaft oil seal, prise out the seal from the casing.
35 If not already removed, unbolt and withdraw the speedometer lockring and drive pinion.
36 Unbolt and remove the extension housing from the final drive.
37 Lift out the speedometer gear, recovering the O-ring seal and shim.
38 Unbolt and remove the final drive half-casing.
39 If the crownwheel bearings are to be re-used, mark the relationship of the bearing outer races and final drive housing.
40 Remove the engagement shaft and finger.



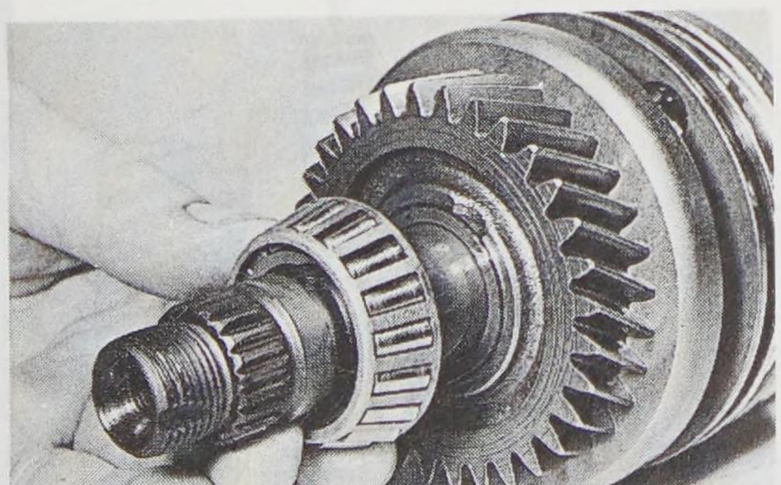
7.32 Prising the input shaft oil seal from the clutch release bearing guide tube

8 Gearbox – examination and renovation

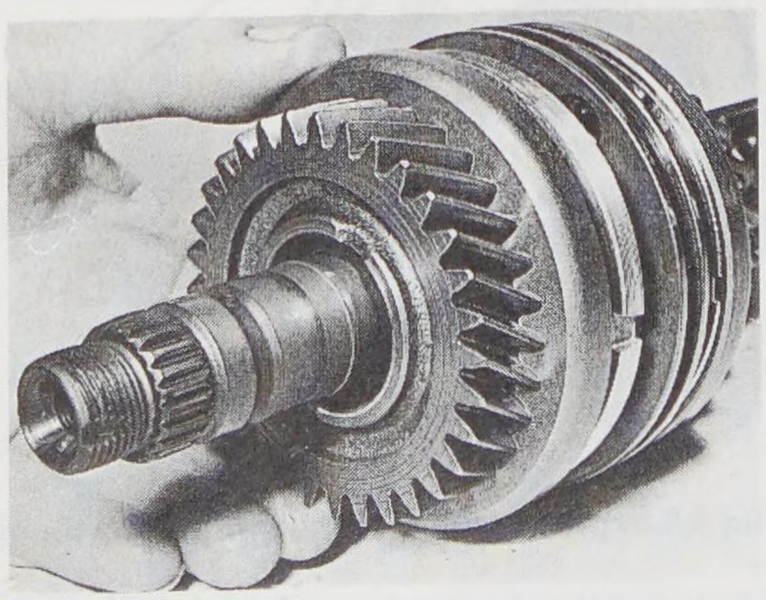
1 Clean all components and examine them thoroughly for wear and damage.
2 Circlips, roll pins, gaskets, oil seals and locking devices should all be renewed as a matter of course. Prise out the old oil seal from the clutch release bearing guide tube, but do not fit the new seal until so instructed during reassembly. Renew the input and output shaft nuts.
3 If new input shaft or differential bearings are to be fitted, a selection of preload shims will be required. Read through the relevant procedures before starting work.

9 Input shaft – dismantling and reassembly

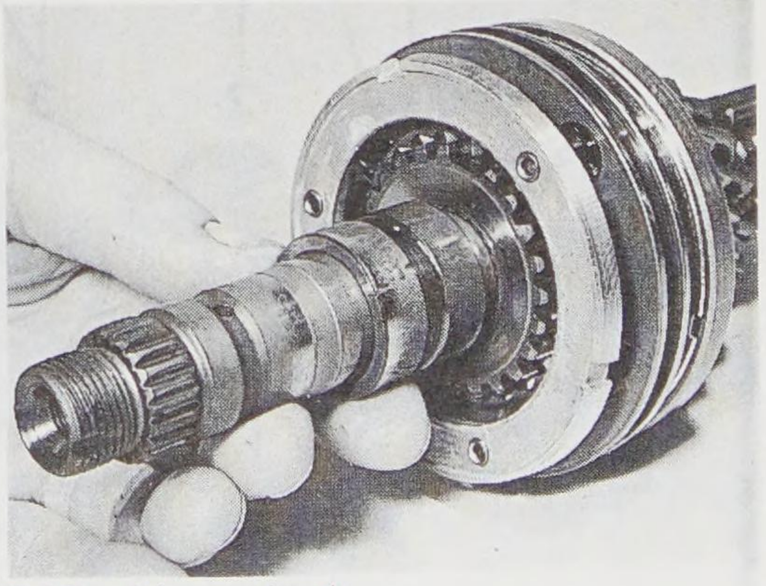
1 Remove the 3rd and 4th gear components from the input shaft by supporting the assembly under the 3rd gear and pressing or driving the shaft through. Protect the end of the shaft. Once the rear bearing is free, the other components can be removed from the shaft in order: 4th gear and its bush, 3rd/4th synchro sleeve and hub and 3rd gear (photos).
2 Mark the synchro sleeve and hub relative to each other and to show which side faces 4th gear.
3 Remove the front bearing from the shaft, preferably with a press or a bearing puller. As a last resort it may be possible to support the bearing and drive the shaft through: be sure to protect the end of the shaft if this is done.
4 Once the input shaft bearings have been removed, they must be renewed. Press the rear bearing outer track from the end casing and press in the new track, making sure it enters squarely.
5 Before commencing reassembly, make sure that the input shaft is free from burrs and wear marks. Lubricate all parts as they are fitted.
6 Fit a new front bearing to the shaft, using a suitable tube to press or drive it home.
7 Fit 3rd gear, 3rd/4th synchro-hub and sleeve, 4th gear and its bush. Take care not to get 3rd and 4th gears mixed up, they are similar in appearance (4th gear has more teeth). If the original synchro components are being refitted, observe the mating marks made during dismantling.



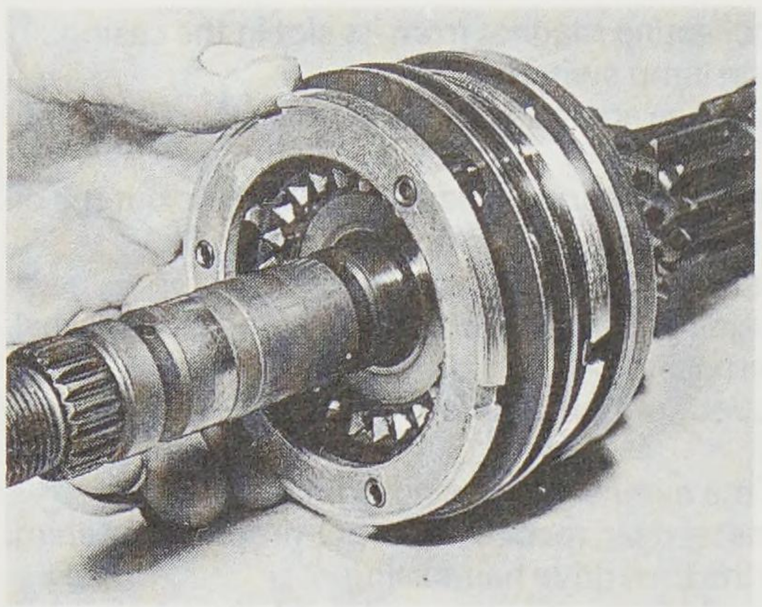
9.1A Input shaft bearing ...



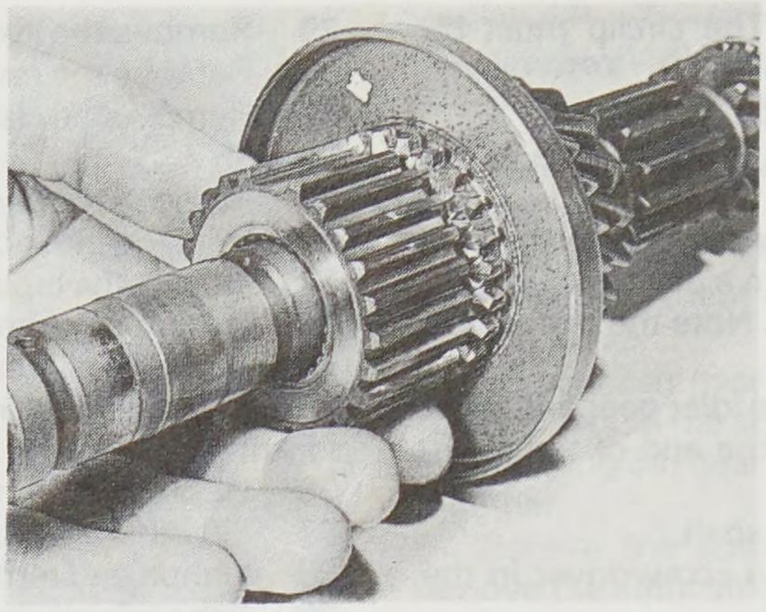
9.1B ... 4th gear ...



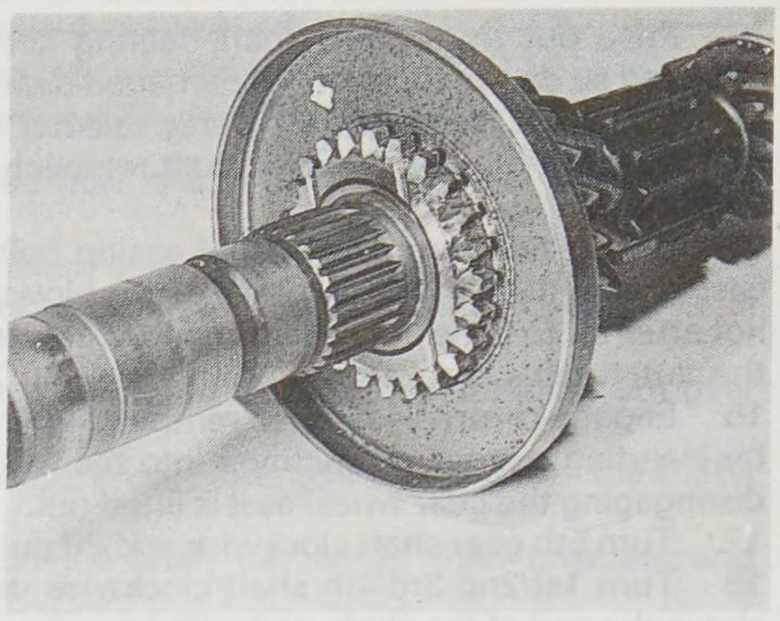
9.1C ... 4th gear bush ...



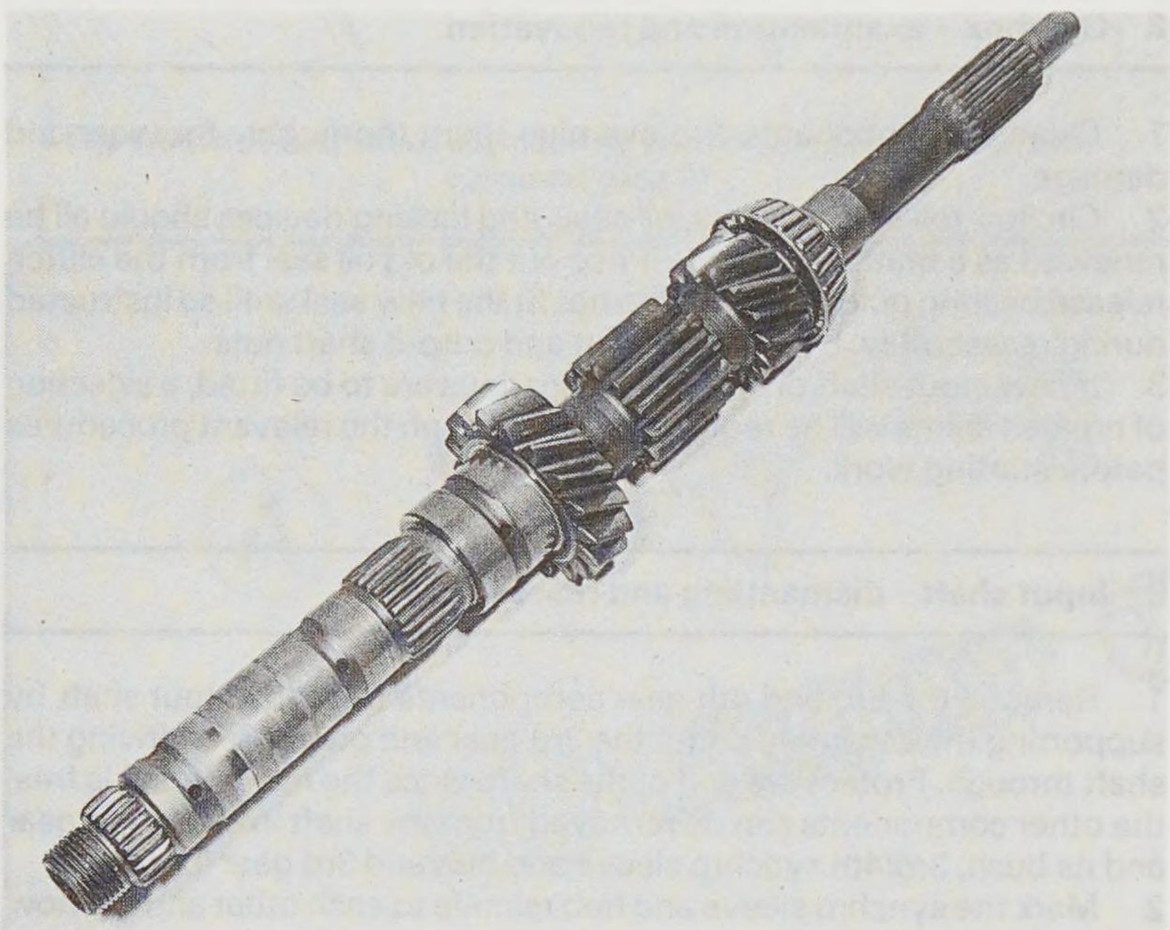
9.1D ... 3rd/4th synchro sleeve ...



9.1E ... synchro-hub ...



9.1F ... and 3rd gear



9.1G Input shaft with all components removed except the front bearing

8 Fit a new rear bearing to the shaft, again using a piece of tube.
9 The input shaft is now reassembled.

10 Output shaft – dismantling and reassembly

1 Remove 5th gear and the rear bearing from the output shaft (photo). Use a puller or bearing extractor if they are a tight fit on the shaft.
2 Remove 3rd/4th gear assembly, 2nd gear and its bush (photos).
3 Make alignment marks between the 1st/2nd synchro-hub and sleeve, then remove them from the shaft (photos).
4 Remove 1st gear and the needle thrust bearing and circlip (photos).
5 Press or drive the shaft out of the pinion end bearing, protecting the end of the shaft.
6 Before commencing reassembly, make sure that the shaft is free from burrs or wear marks. Lubricate all parts as they are fitted.
7 Fit the pinion end bearing to the shaft, using a piece of tube to drive or press it home and fit a new circlip.
8 Fit the needle thrust bearing.
9 Refit 1st gear.
10 Refit the 1st/2nd synchro unit, observing the mating marks made when dismantling. The chamfer on the external teeth must face towards 1st gear.
11 Fit 2nd gear and its bush.
12 Fit the 3rd/4th gear assembly, making sure it is the right way round.

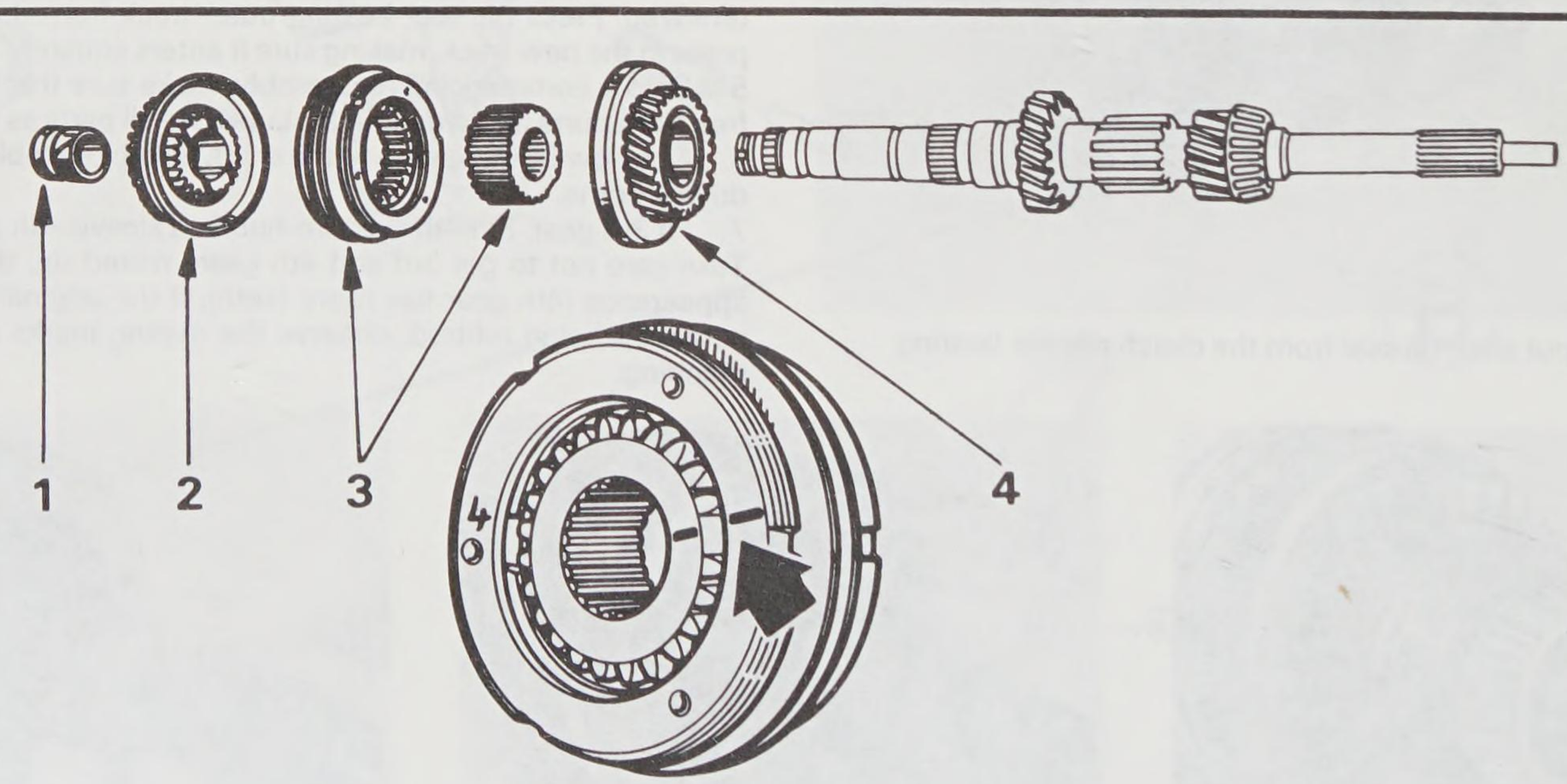
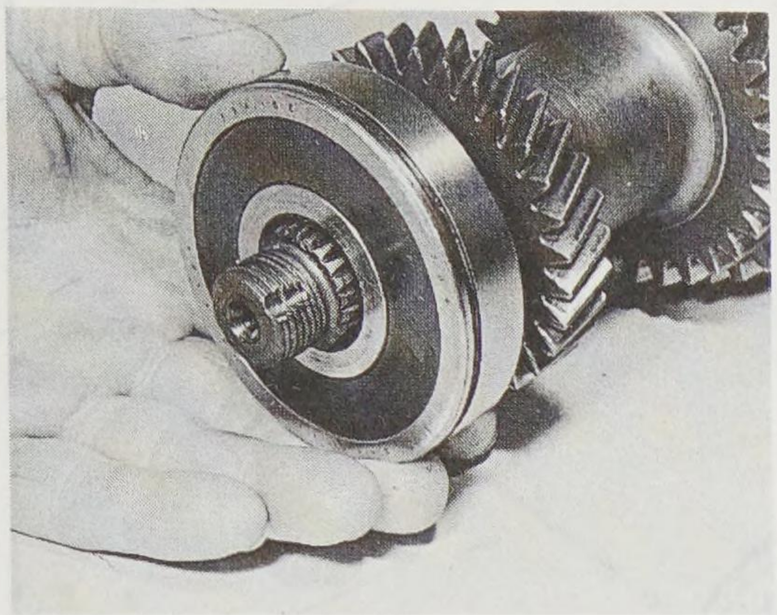
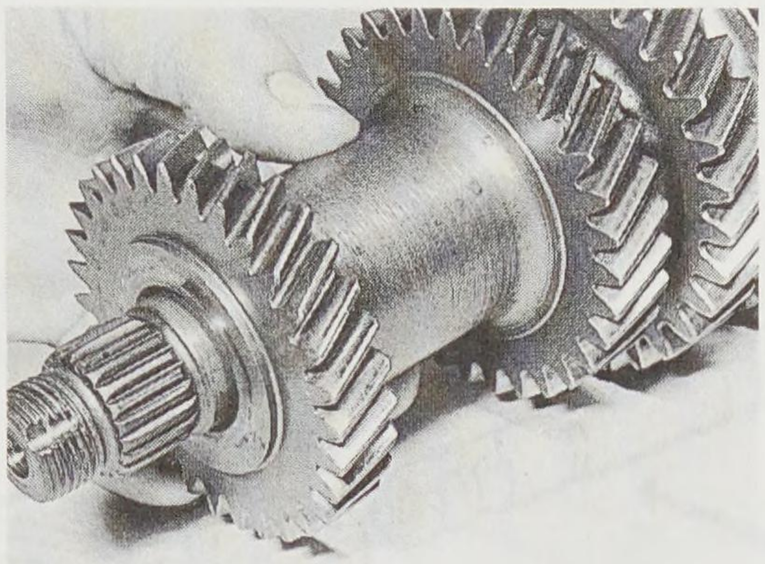


Fig 6.8 Exploded view of the input shaft (Sec 9)

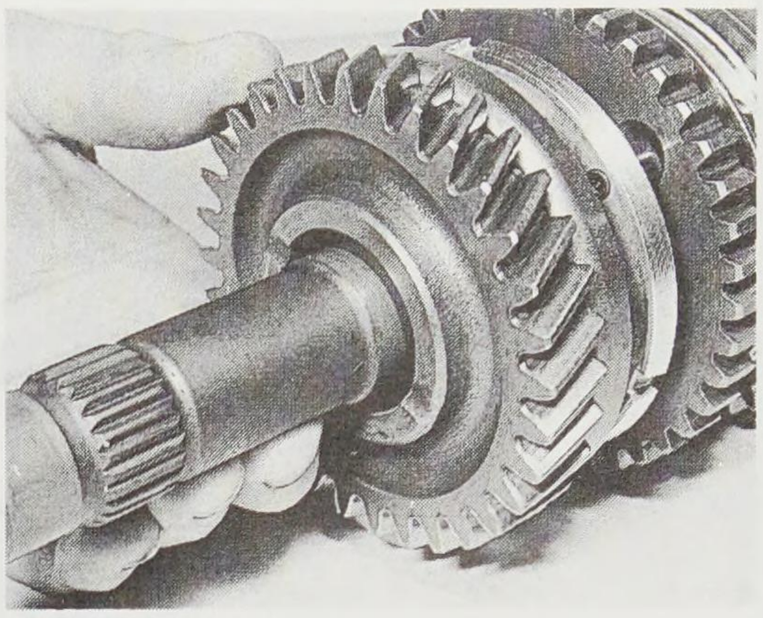
1 4th gear bush
2 4th gear
3 3rd/4th synchro-hub and sleeve
4 3rd gear
Arrow shows alignment marks



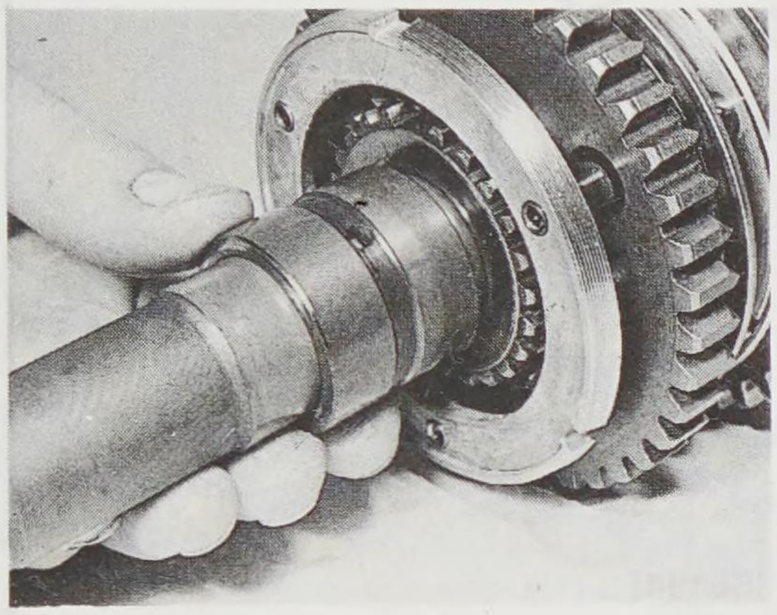
10.1 Output shaft rear bearing



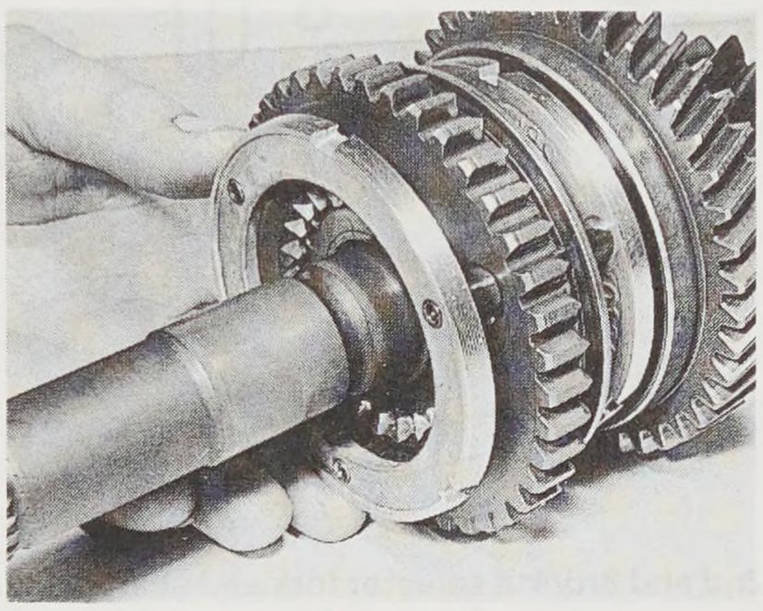
10.2A 3rd/4th gear assembly ...



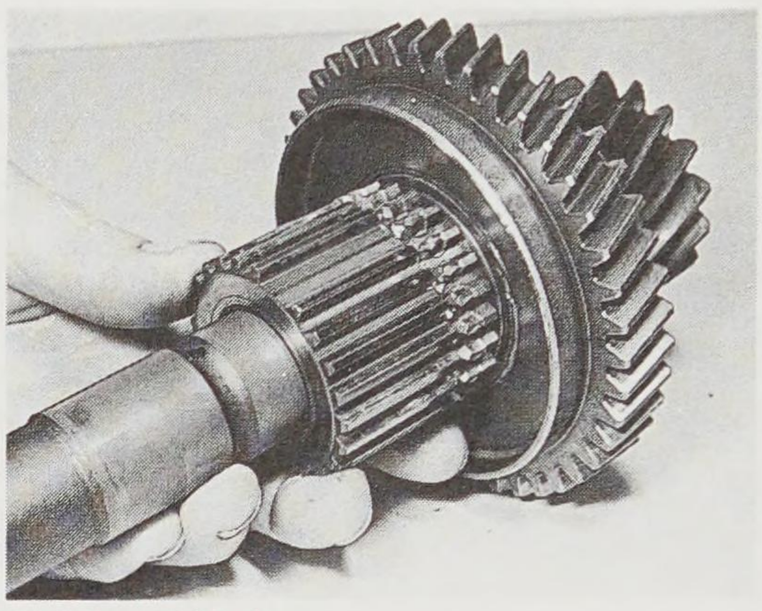
10.2B ... 2nd gear ...



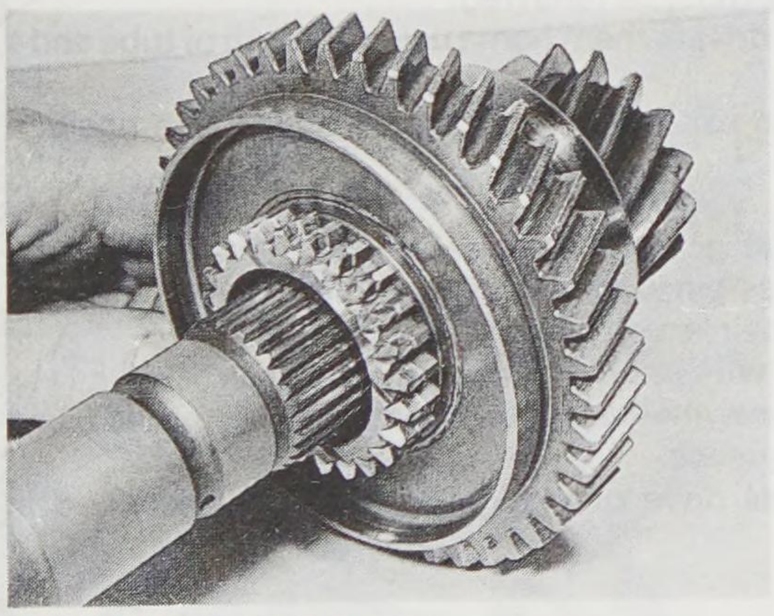
10.2C ... and 2nd gear bush



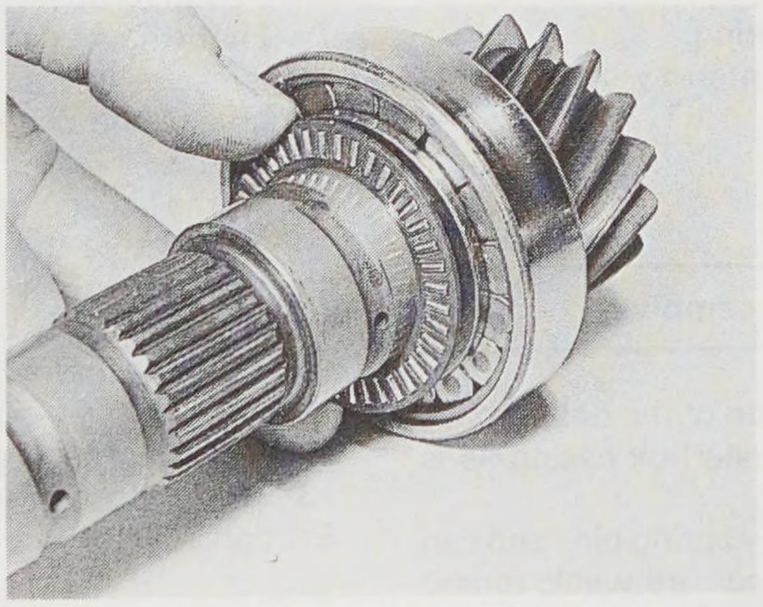
10.3A 1st/2nd synchro sleeve ...



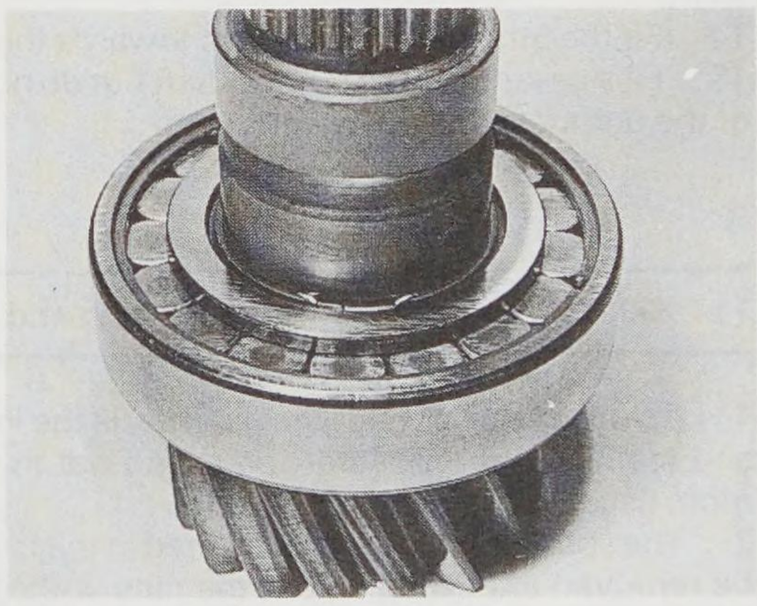
10.3B ... and hub



10.4A Remove 1st gear ...



10.4B ... the needle thrust bearing ...



10.4C ... and the bearing circlip

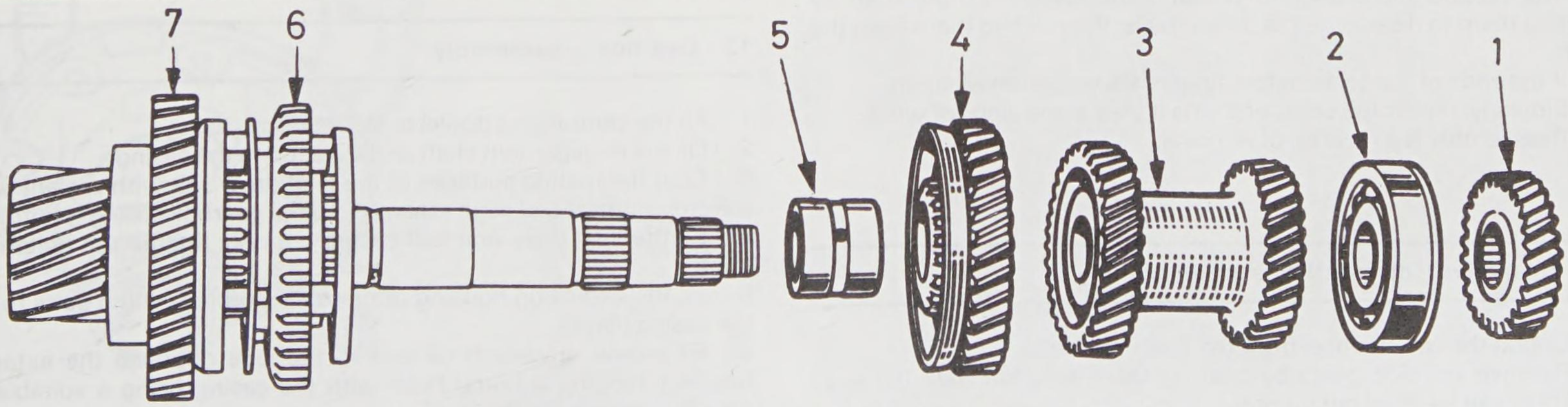


Fig 6.9 Exploded view of the output shaft and components (Sec 10)

1 5th gear
2 Bearing
3 4th and 3rd gears
4 2nd gear
5 2nd gear bush
6 1st/2nd synchro-hub and sleeve
7 1st gear

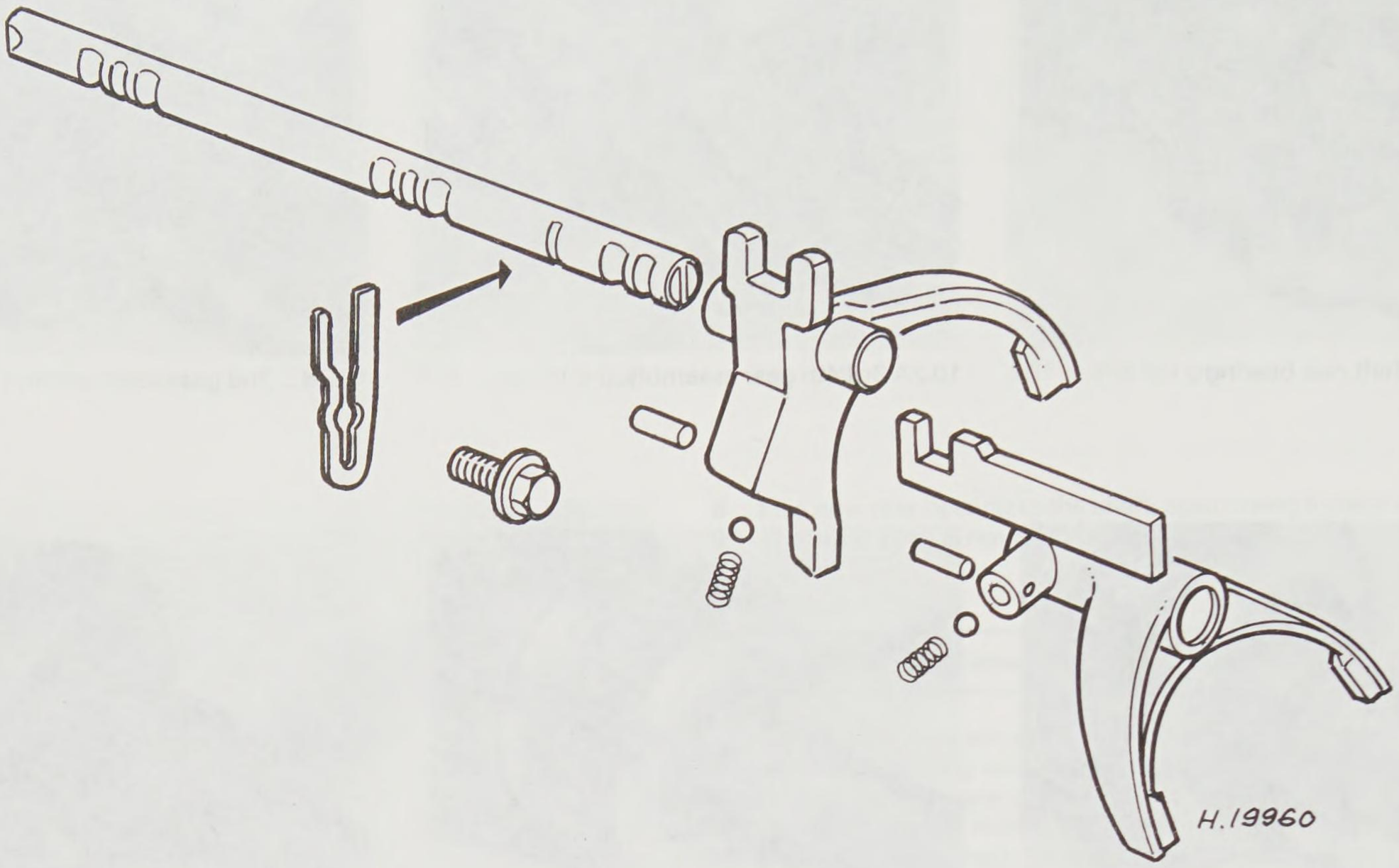


Fig 6.10 1st/2nd and 3rd/4th selector fork and shaft assembly (Sec 11)

13 Fit the rear bearing, with the circlip groove nearest the tail of the shaft.
14 Fit the 5th gear with its boss towards the bearing.
15 Fit a new nut to the output shaft but do not tighten it yet. Assembly of the output shaft is now complete.

11 Selector mechanism – dismantling and reassembly

1 An unusual feature of the gearbox is the location of the detent balls and springs in the selector forks, and not in the gearbox casing as is more usual.
2 The springs and balls are retained in the forks by spring pins and can be removed after tapping out the pins. If the springs are weak, renew them.
3 The 5th selector fork is retained on its selector shaft by a spring pin.
4 The 1st/2nd and 3rd/4th forks can be removed from the shaft by rotating them to disengage the detent balls, then sliding them from the shaft.
5 If the ends of the selector fork fingers are worn, renew them.
6 Similarly, renew the selector shafts if they show signs of wear.
7 Reassembly is a reversal of removal.

12 Final drive – dismantling and reassembly

1 Unbolt the crownwheel from the final drive cage.
2 Remove the side gears by pushing them around inside the cage until they can be lifted out (photo).
3 Drive out the roll pins which secure the cross-pin in the cage.
4 Extract the cross-pin and remove the pinion gears and thrust-washers (photo).
5 If necessary, remove the bearings using a press or bearing puller.
6 Examine all components for wear and damage and renew as necessary. Lubricate all components before reassembly. If the bearings have been removed, they must be renewed.
7 Fit the new bearings, driving them home using a length of tube and a press.
8 Locate the centralising spacer in the cage, retaining it in position with grease.
9 Fit the side gears.
10 Assemble the pinion gears, thrustwashers and cross-pin to the cage, then secure the cross-pin with new roll pins. Note that the pins are only knocked in by half their length (photo).
11 Fit the crownwheel with its chamfer toward the cage.
12 Fit and tighten the crownwheel bolts to the specified torque using a diagonal tightening sequence.
13 Refitting of the final drive unit to the gearbox is described in Section 13.

13 Gearbox – reassembly

1 Fit the centralising dowel to the gearbox casing.
2 Oil the engagement shaft and slide it into the casing.
3 Coat the mating surfaces of the final drive unit with sealant and fit the crownwheel and cage assembly to the gearbox casing (photo).
4 Fit the final drive unit half-casing but only tighten the bolts finger tight.
5 Fit the extension housing temporarily and nip up the bolts to align the casing halves.
6 Fit a new driveshaft oil seal to the side opposite the extension housing, tapping it home flush with the casing using a suitable size socket or length of tube.
7 If new final drive bearings have been fitted, the final drive unit preload must now be calculated and set as follows.
8 Remove the extension housing and fit a 2.2 mm thick preload shim to the bearing outer race.
9 Refit the extension housing, without its O-ring seal.

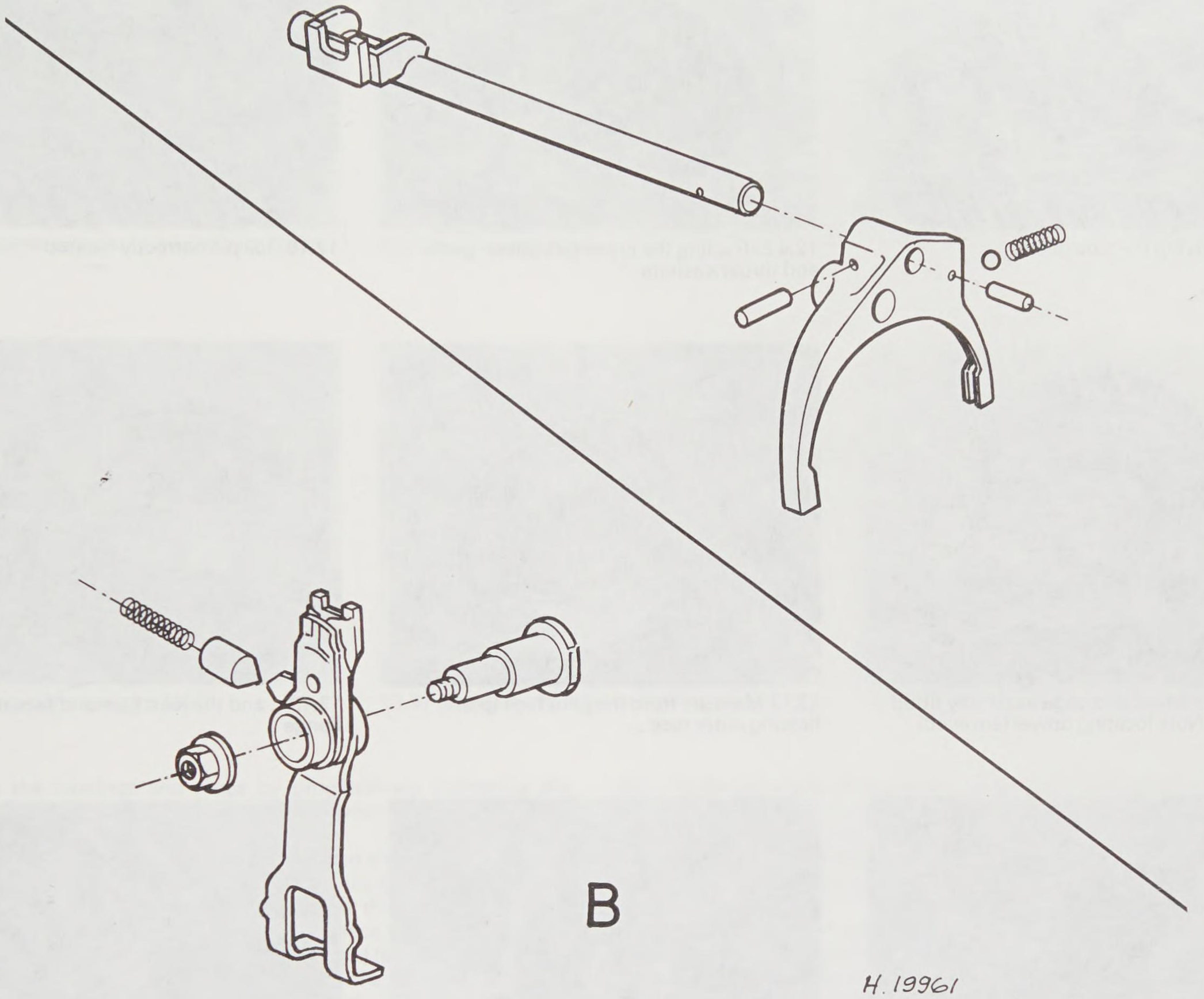


Fig 6.11 5th gear selector shaft and fork (A) and reverse selector assembly (B) (Sec 11)

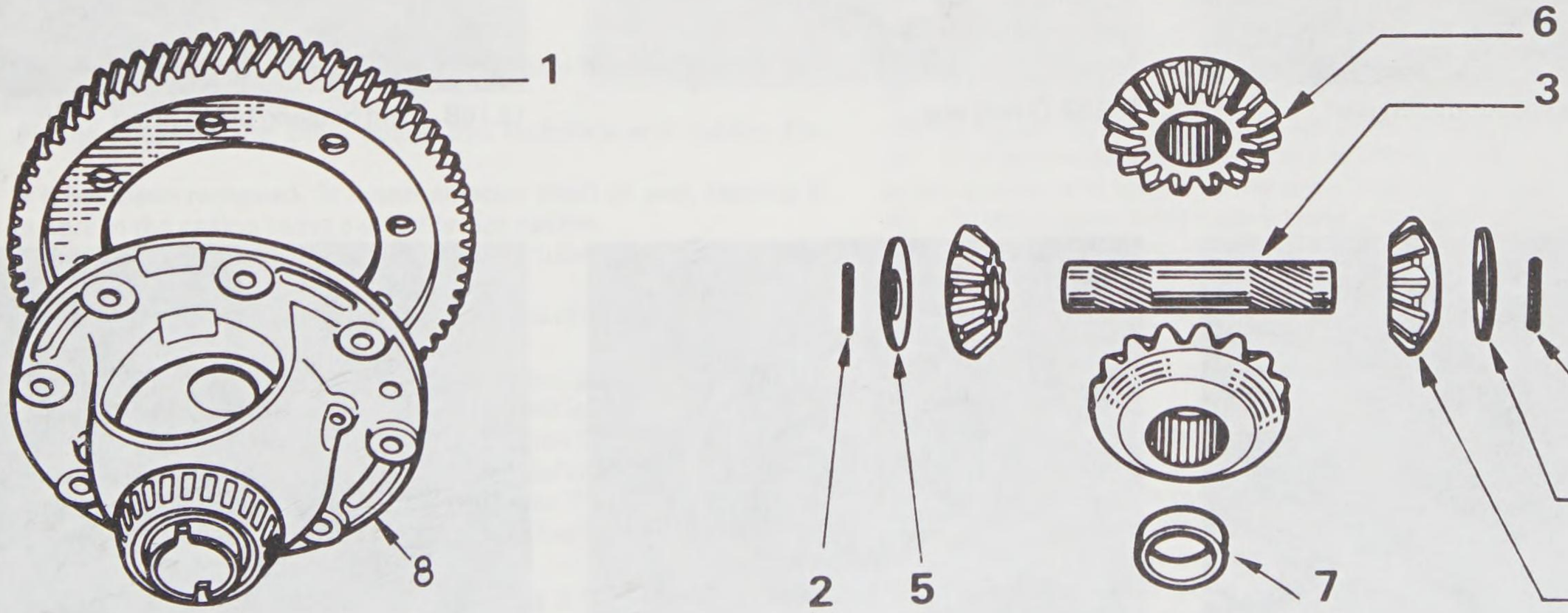
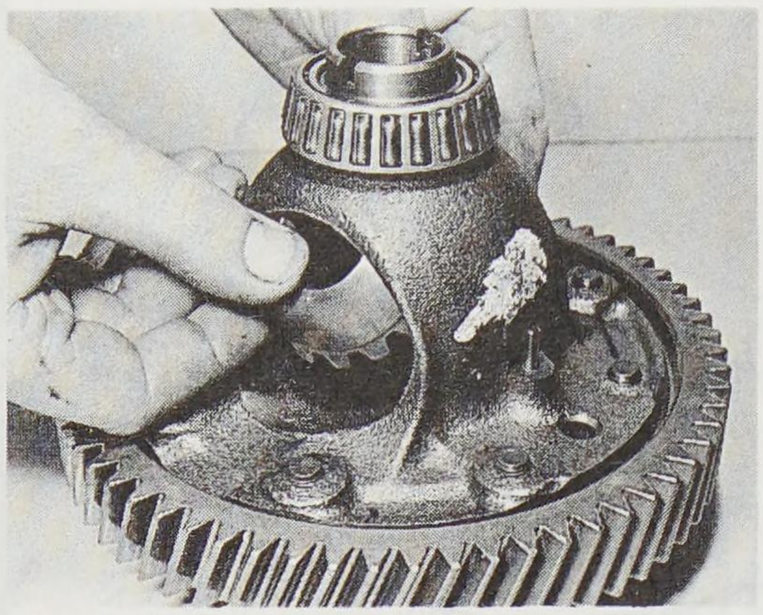
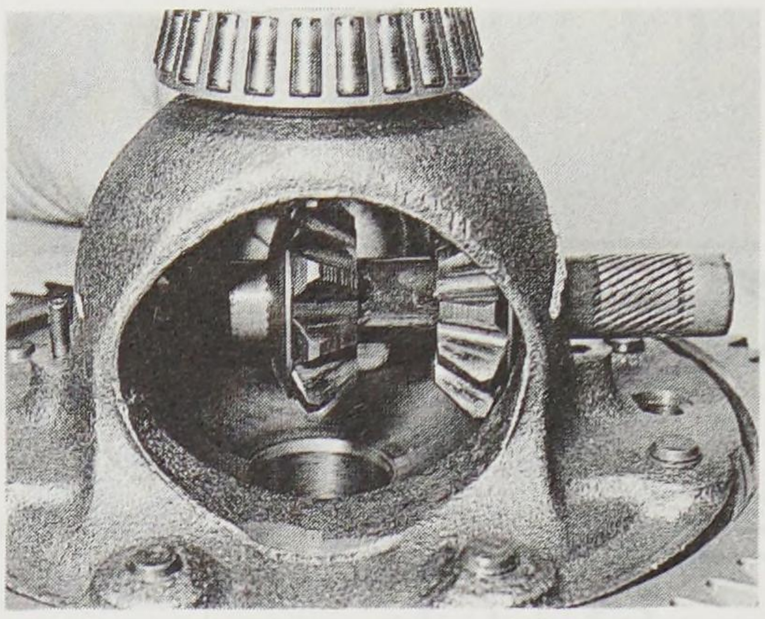


Fig 6.12 Exploded view of the final drive assembly (Sec 12)

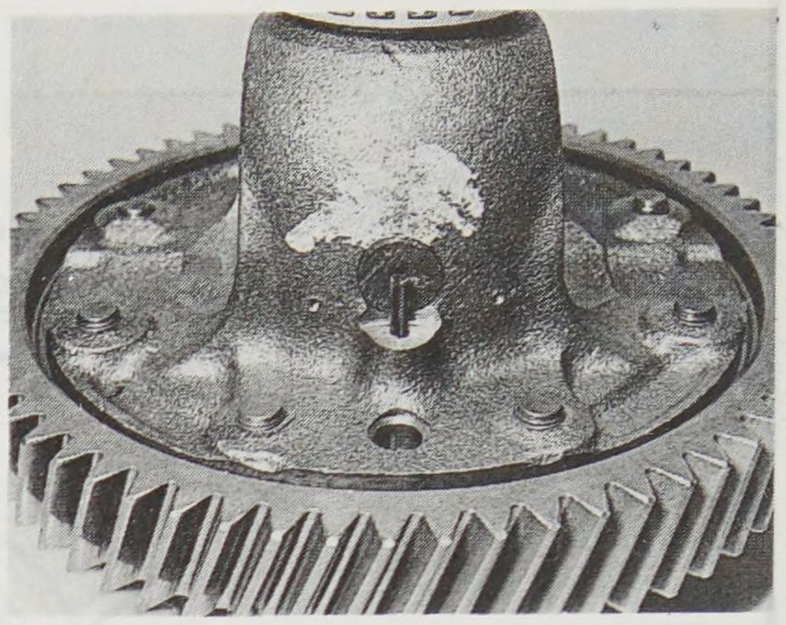
1 Crownwheel
2 Roll pin
3 Cross-pin
4 Pinion gear
5 Thrustwashers
6 Side gear
7 Centralising spacer
8 Cage



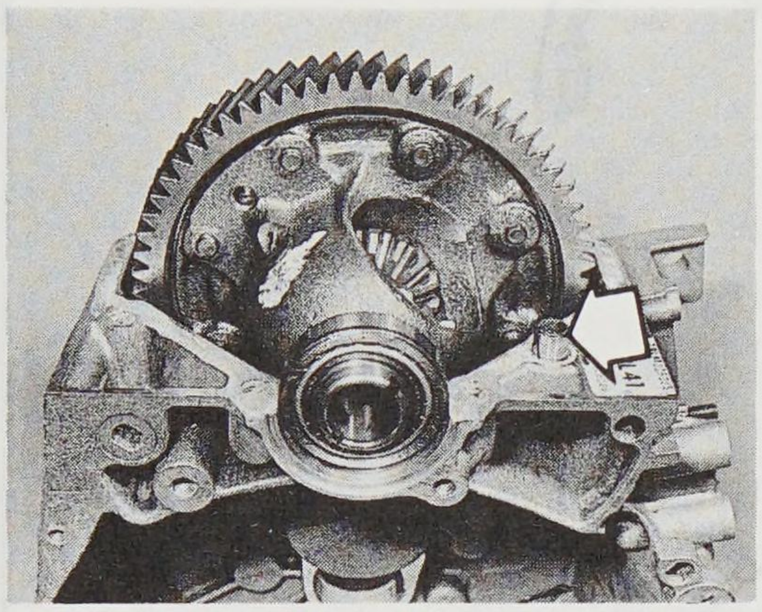
12.2 Removing the side gears



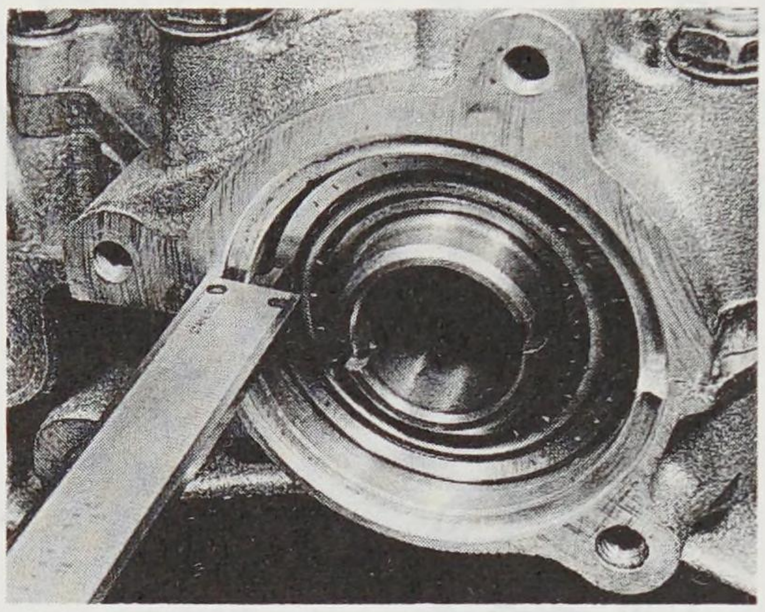
12.4 Extracting the cross-pin, pinion gears and thrustwashers



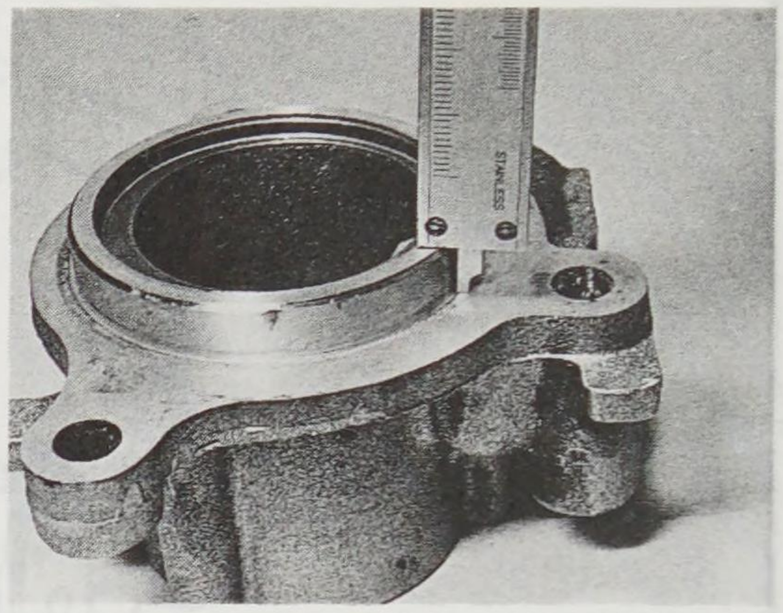
12.10 Roll pin correctly located



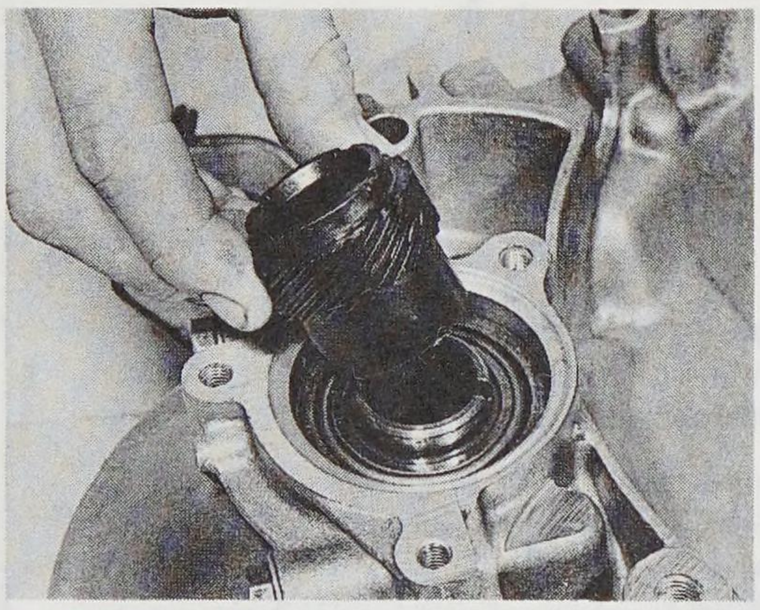
13.3 Crownwheel and cage assembly fitted to casing. Note locating dowel (arrowed)



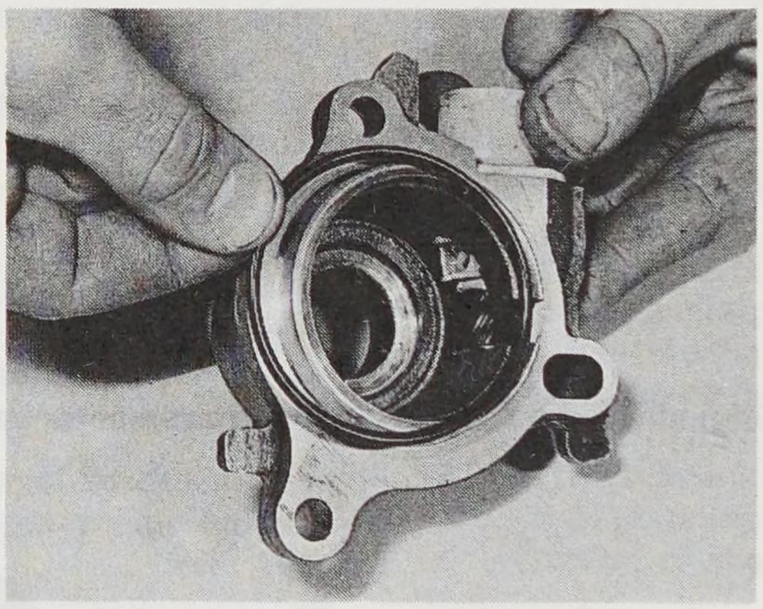
13.12 Measure from the joint face to the bearing outer race ...



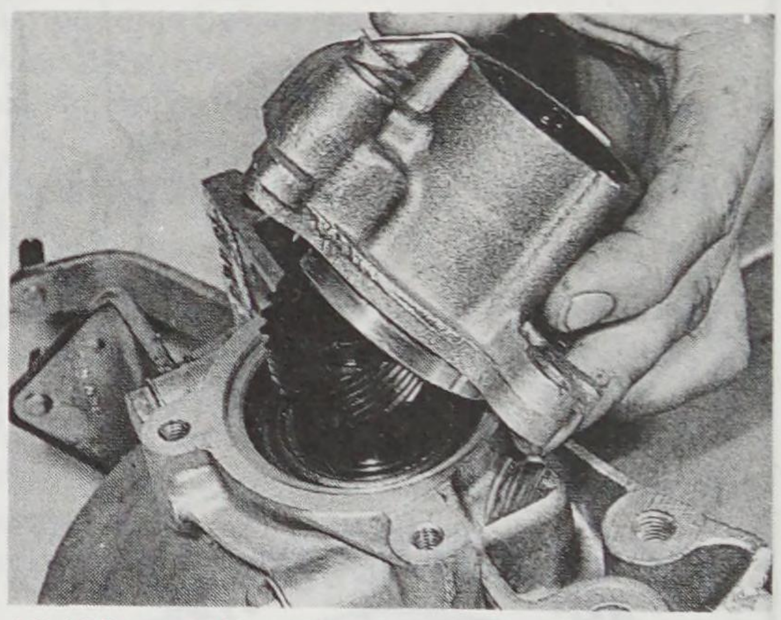
13.13 ... and the joint face and face of the flange



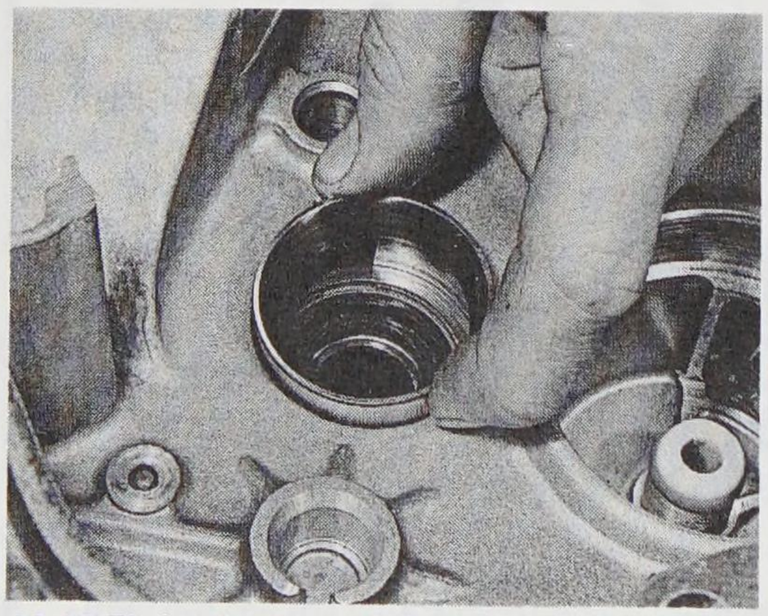
13.17 Fitting the speedometer gear



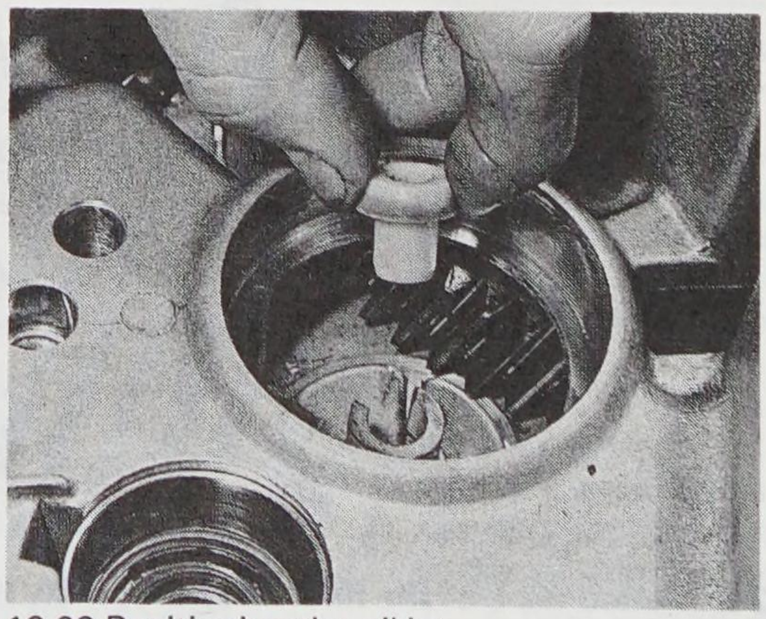
13.18A O-ring seal ...



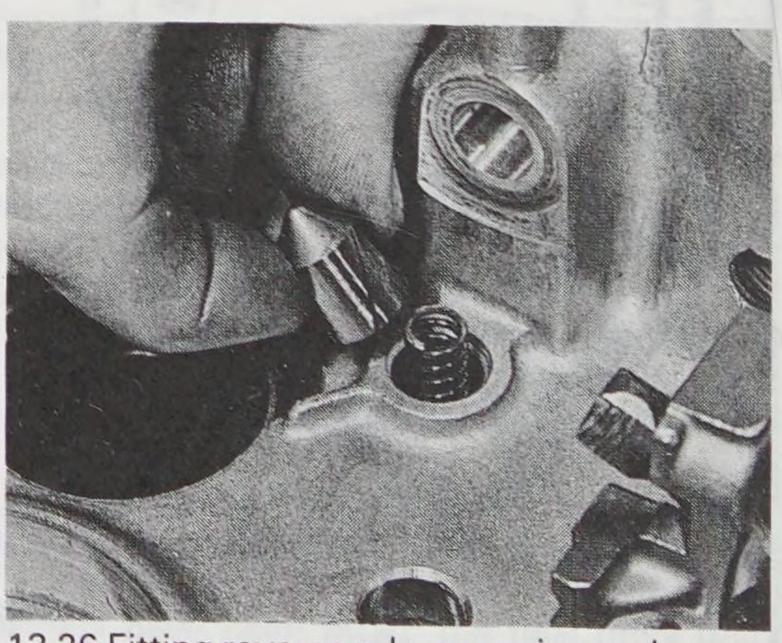
13.18B ... and housing being fitted



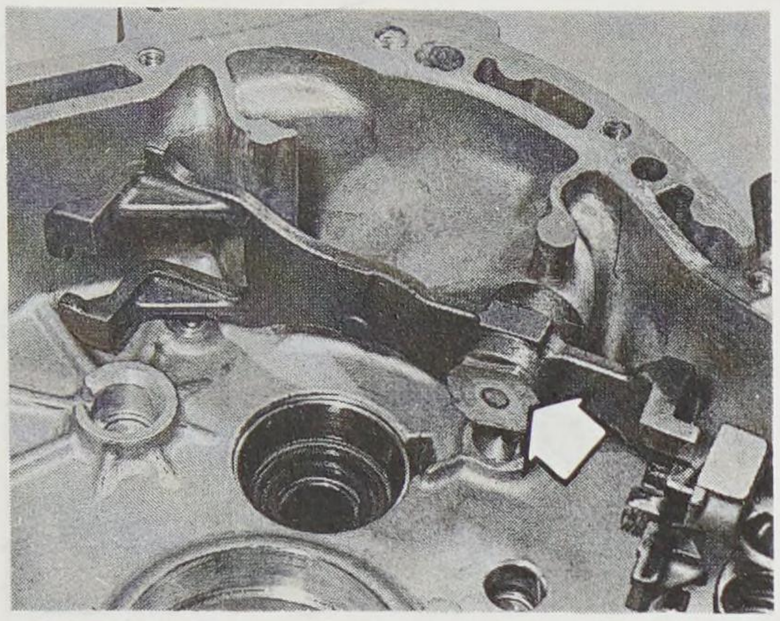
13.22 Fitting input shaft bearing outer race



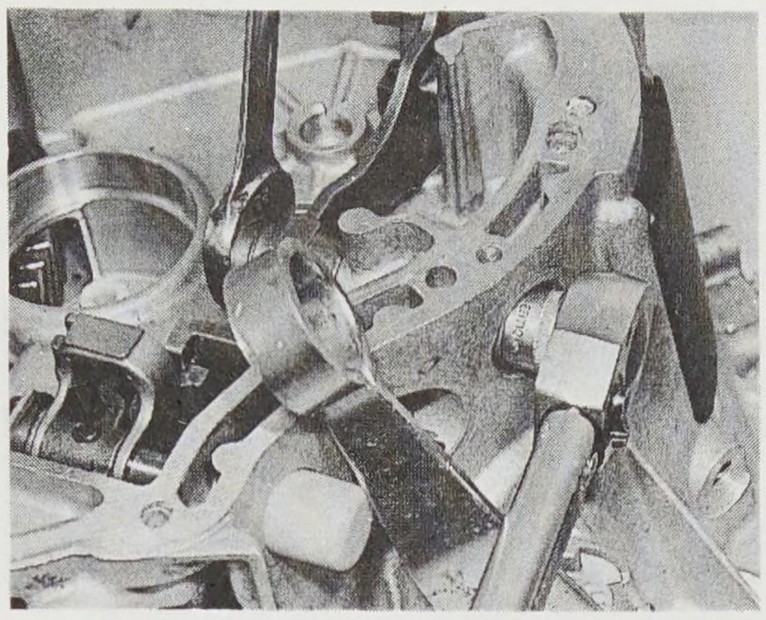
13.23 Positioning the oil jet



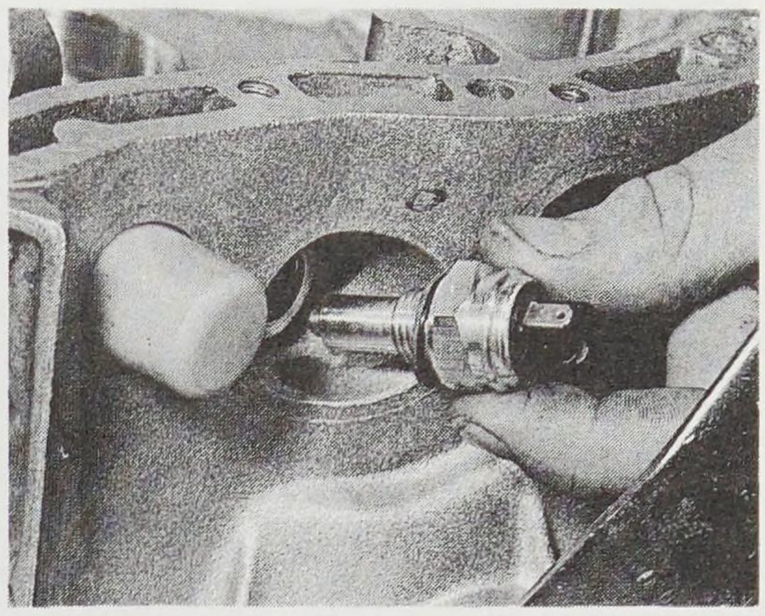
13.26 Fitting reverse release spring and plunger



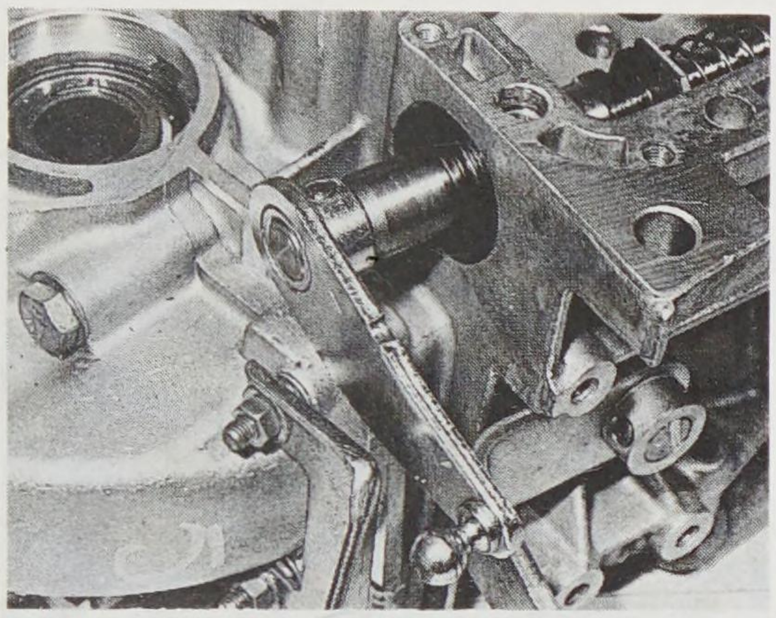
13.27A Reverse selector lever and pivot bolt (arrowed) ...



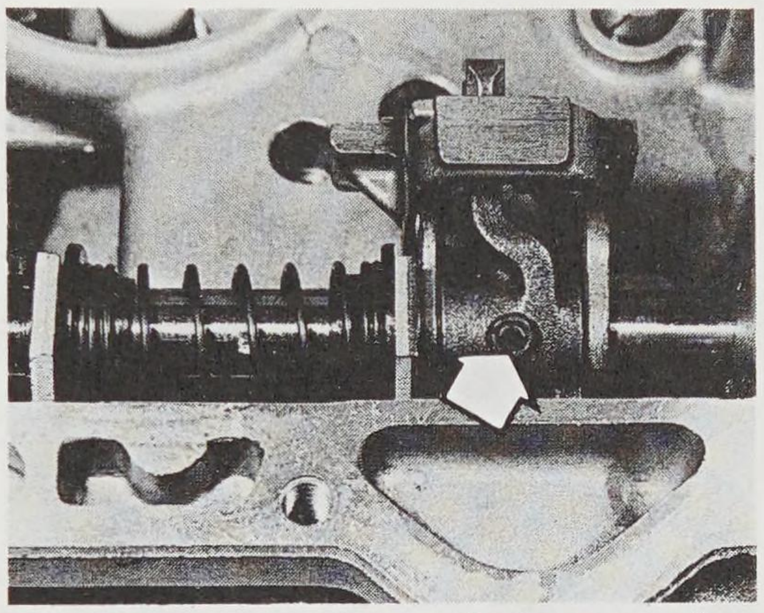
13.27B ... being tightened



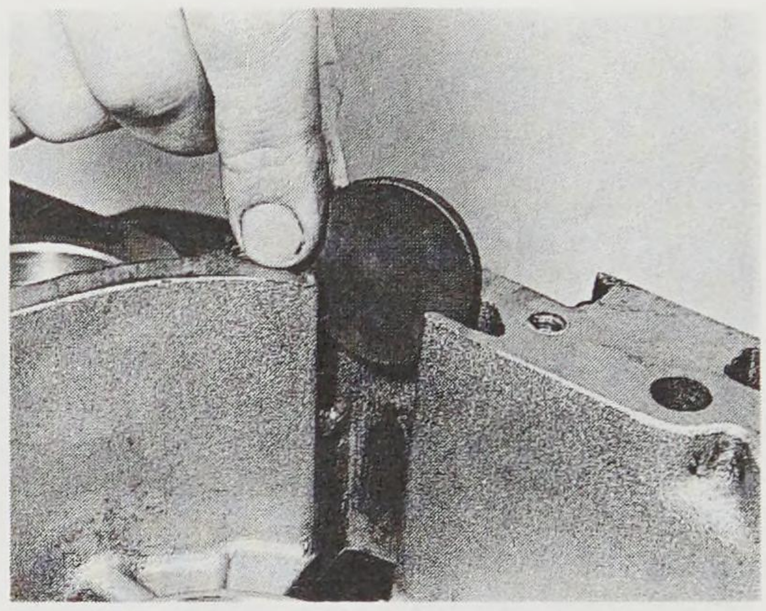
13.28 Screwing in the reversing lamp switch



13.30 Sliding in the selector shaft

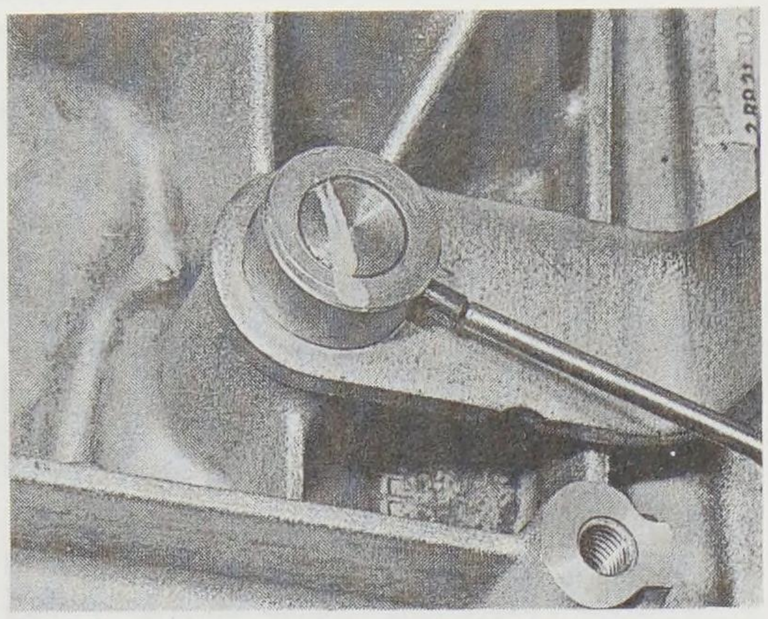


13.31 Engagement finger roll pin (arrowed)

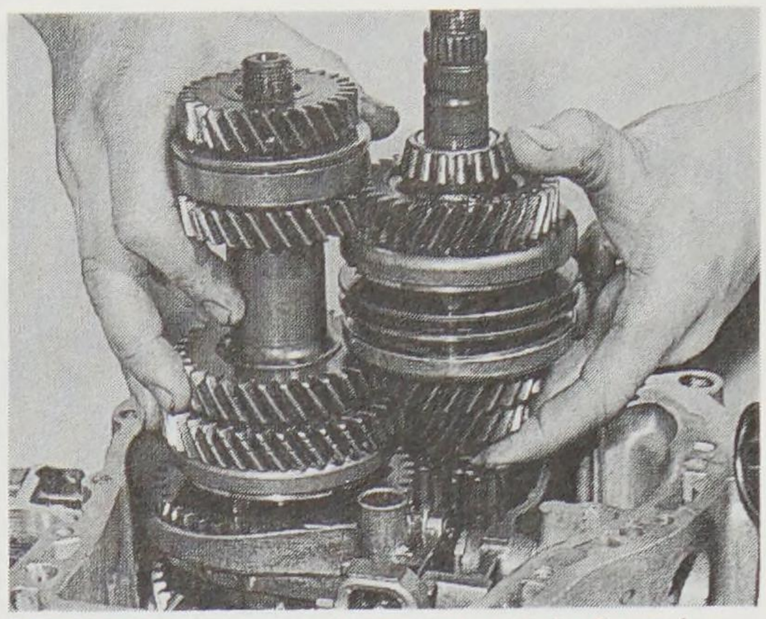


13.32 Fitting swarf collecting magnet

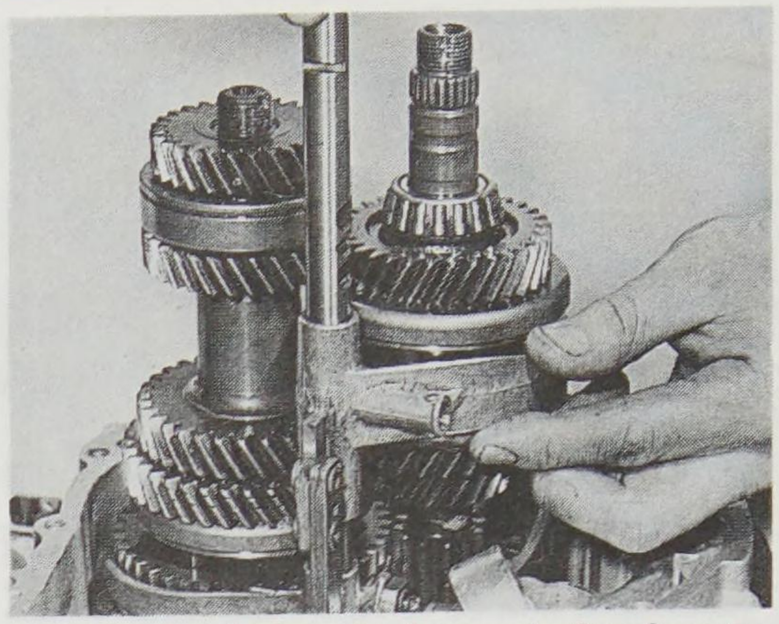
10 Settle the bearings and races by progressively tightening the extension housing bolts while turning the crownwheel until resistance is felt.
11 Remove the extension housing and preload shim.
12 Using a depth gauge, measure the distance between the casing joint face and the bearing outer race (photo). Call this measurement (a).
13 Measure the distance between the joint face and the face of the flange on the extension housing (measurement b) (photo).
14 Subtract (b) from (a) and add 0.1 mm to the result which is the thickness of shim required to set bearing preload.
15 Tighten the final drive housing bolts to the specified torque.
16 Fit the previously calculated preload shim to the bearing outer race.
17 Fit the speedometer gear (photo).
18 Oil and fit a new O-ring seal to the extension housing then fit the housing and tighten the bolts (photos).
19 Fit the speedometer drive pinion and lockplate and tighten the bolt.
20 If it has been removed, fit a new selector shaft oil seal, tapping it into its bore in the casing using a suitable size socket.
21 Temporarily fit the release bearing guide tube without its gasket and only finger tighten the bolts.
22 Fit the input shaft front bearing outer race with the lettering on the rim facing toward the clutch end (photos).
23 Position the oil jet in the output shaft bearing gallery (photo).
24 Bolt the selector lever spring bracket in position.
25 Ensure the centralising dowels are in position in the main casing.
26 Fit the reverse release spring and plunger (photo).
27 Push the plunger down into its bore against the spring and fit the reverse selector lever, tightening the pivot bolt and nut squarely (photos).
28 Screw in the reversing lamp switch, using a new copper sealing washer, and tightening it to the specified torque (photo).
29 Assemble the selector lever spring, washers, spacer, interlock key and selector shaft/lever.
30 Slide the shaft into the casing and through the assembled components (photo).
31 Tap in a new roll pin to secure the engagement finger to the shaft (photo).
32 Fit the swarf collecting magnet to its slot in the casing (photo).
33 Pull the selector lever out and down to lock it against the casing.
34 Pull the interlock key upward.
35 Fit a new O-ring seal to the engagement shaft, followed by the washer and spring, then the lever. Secure the lever with a new roll pin (photo).
36 Assemble the input and output shafts together with 1st/2nd selector fork and position the assembly in the casing (photo).
37 Engage reverse gear.
38 Fit 3rd/4th fork to the input shaft then fit 1st/2nd-3rd/4th fork shaft (photo).
39 Fit the reverse idler gear and shaft noting that the grooved side of the gear faces up and that the pin must protrude from the shaft by 5.0 mm (0.20 in) (photos).
40 Fit 5th gear selector shaft (photo).
41 Coat the clutch housing joint face with sealant, then fit the gearbox casing, tightening the bolts to the specified torque (photo).
42 Fit the reverse shaft retaining bolt into the side of the casing using a new washer and tighten to the specified torque (photo).
43 Fit the reverse shaft locking plate and tighten the bolt (photo).
44 Fit a new bearing retaining circlip to the output shaft bearing, ensuring that it snaps into the groove in the bearing (photo). Pull the shaft upward to achieve the fit if necessary.
45 Fit and tighten the bearing retaining bolts and washers (photo).
46 Fit the spacer flat side up and 5th gear bush to the input shaft (photos).
47 Slide on 5th gear, synchro-hub and sleeve (photos).
48 Engage 3rd/4th gear, apply thread-locking compound to a new nut, then fit and tighten the nut on the output shaft to the specified torque. Stake the nut to the shaft (photos).
49 Remove 5th gear and synchro-hub and sleeve, align the marks made during dismantling and fit the selector fork, refitting the complete assembly to the input shaft.
50 Fit the locking ball to the fork and push it into its bore with a small screwdriver, then push the assembly down onto the input and selector shafts (photo).
51 Engage two gears to lock the gear trains.
52 Apply thread-locking compound to a new shaft nut, fit and tighten the nut to the specified torque (photo), then stake it to the shaft.



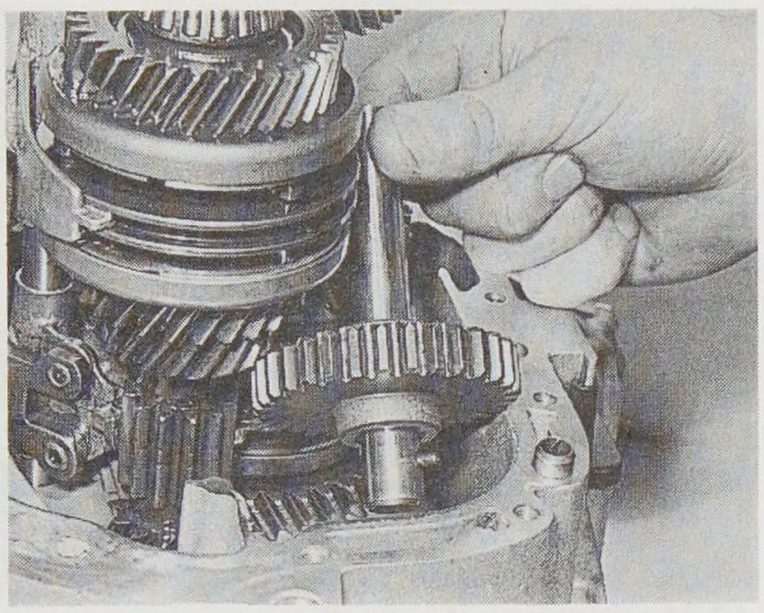
13.35 Tapping in a new roll pin to secure engagement lever



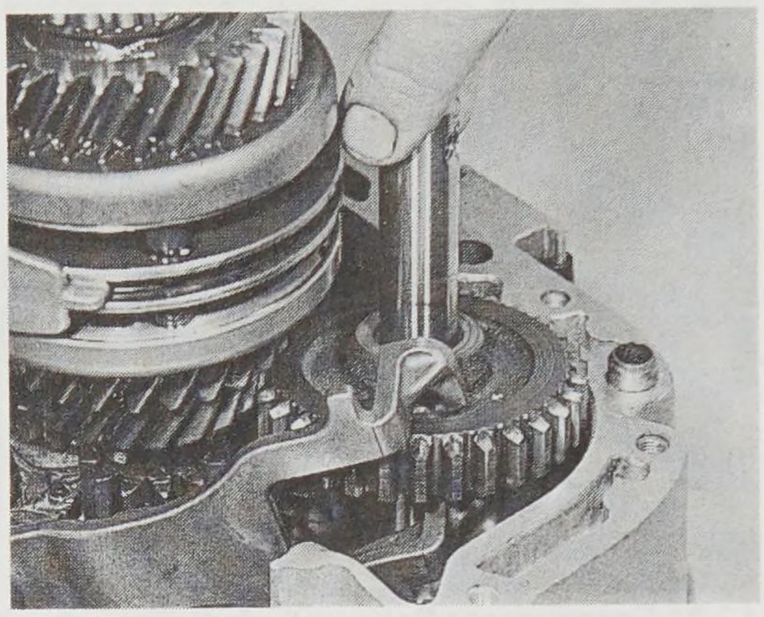
13.36 Fitting input shaft, output shaft and 1st/2nd selector fork



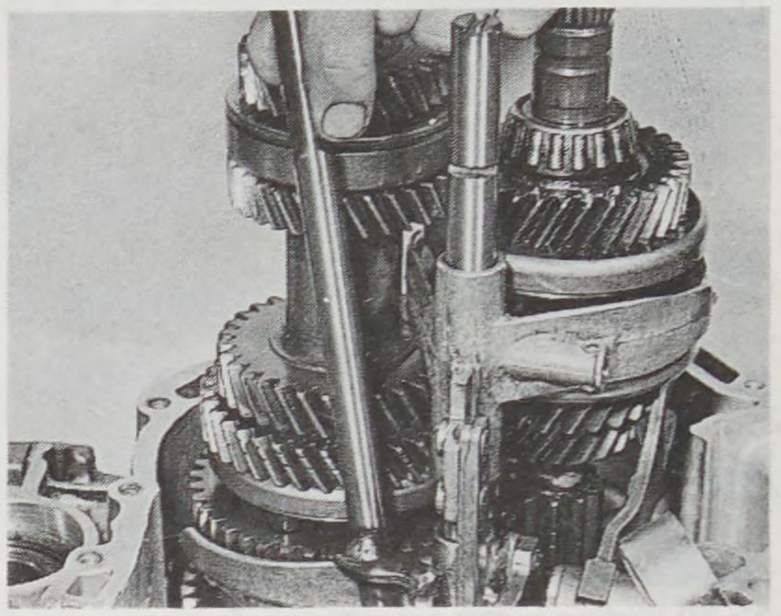
13.38 Fitting fork and selector shaft to input shaft



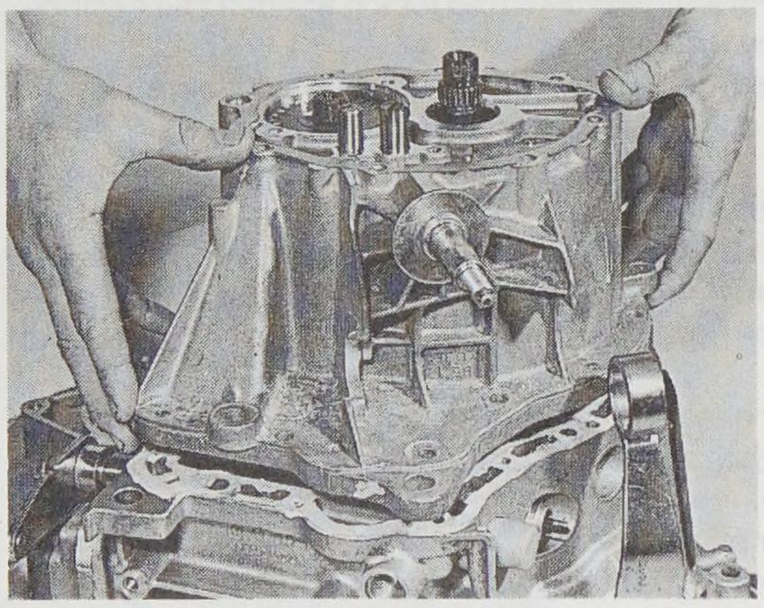
13.39A Fitting reverse idler gear ...



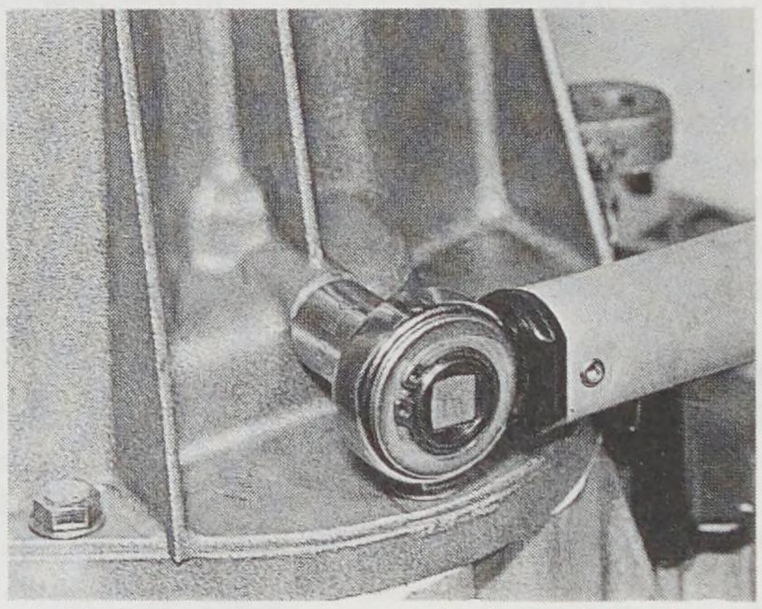
13.39B ... and shaft



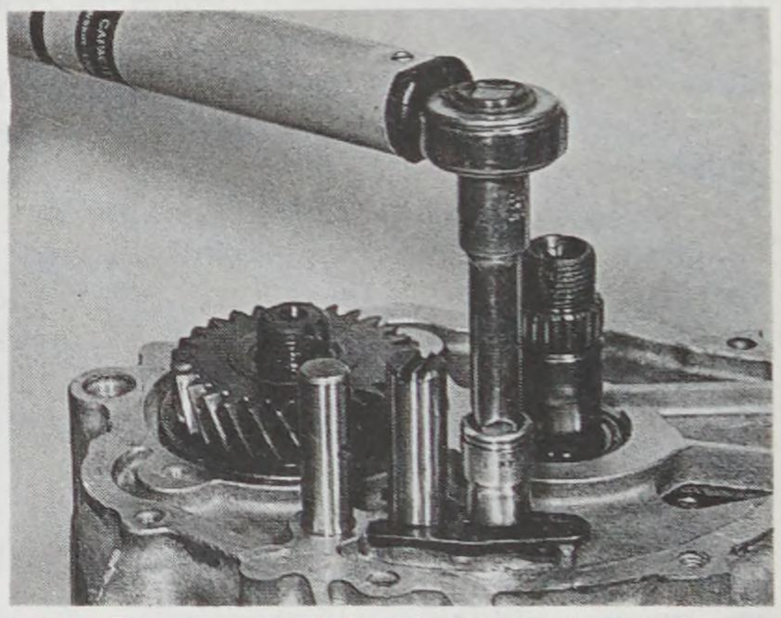
13.40 Fitting 5th gear selector shaft



13.41 Positioning the gearbox casing onto the clutch housing

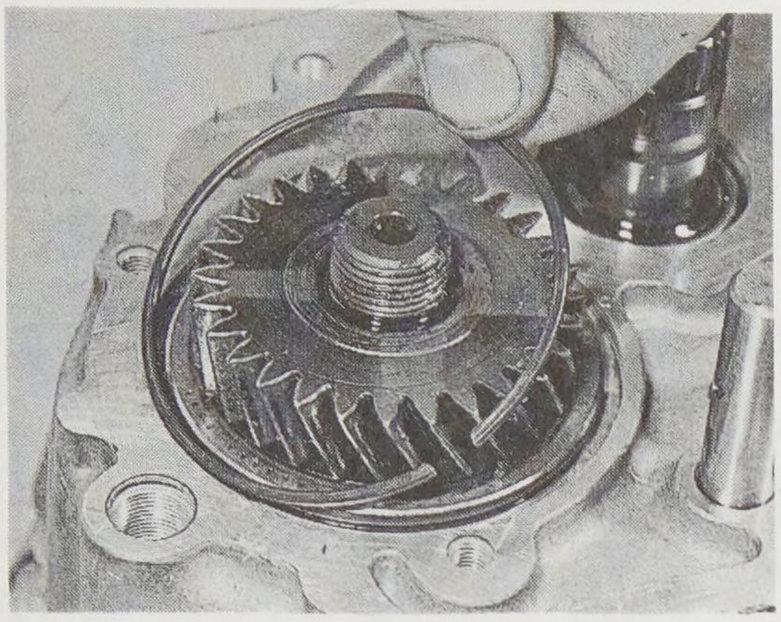


13.42 Tightening reverse shaft retaining bolt

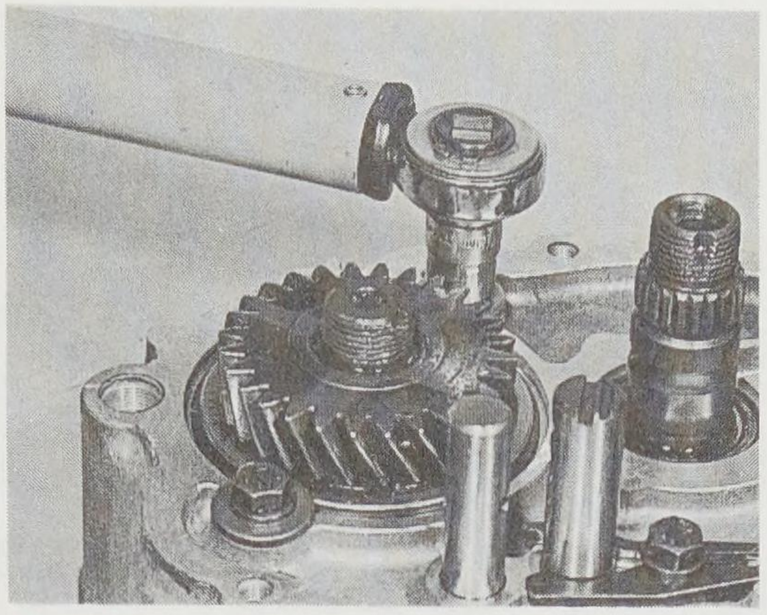


13.43 Reverse shaft locking plate bolt being tightened

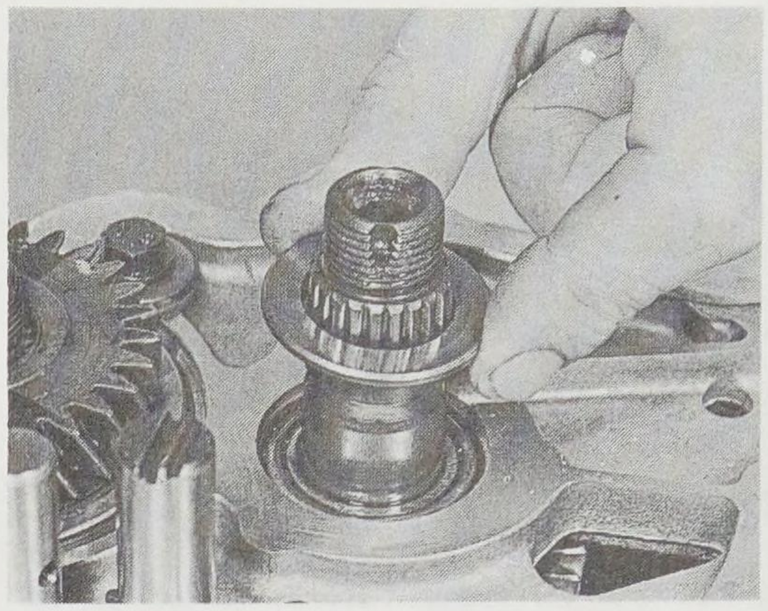
53 Line up the holes in the selector fork and shaft and tap in a new roll pin (photo).
54 Apply sealant to the joint face of the rear cover, fit the cover and tighten the retaining bolts. Note that the filler/level plug has a different torque setting to the retaining bolts (photos).
55 The input shaft bearing adjustment shim thickness must now be calculated as follows.
56 Remove the clutch release bearing guide tube.
57 Fit a preload shim (any size) to the outer race of the input shaft bearing.
58 Refit the release bearing guide tube without its gasket.
59 Tighten the guide tube retaining bolts progressively while turning the input shaft, until the shaft becomes difficult to turn. If the shaft does not become difficult to turn even with the guide tube bolts fully tightened, repeat the procedure using a thicker preload shim.
60 Remove the guide tube and shim.
61 Using a depth gauge, measure the distance between the front face of the clutch housing and the input shaft bearing outer race (photo). Call this measurement (a).
62 Measure the distance between the release bearing guide tube flange and front face of the guide tube, measurement (b) (photo).
63 Add 0.3 mm (0.012 in) to the difference between these two measurements (a – b) to allow for the thickness of the gasket, then select a shim that will give a final clearance of 0.08 mm ± 0.04 mm (0.003 in ± 0.001 in).
64 Fit a new oil seal into the release bearing guide tube.
65 Fit the selected shim over the input shaft and onto the front face of the bearing (photo).
66 Fit the release bearing tube using a new gasket and tighten the bolts to the specified torque (photo).
67 Fit the clutch release arm and fork as described in Chapter 5, Section 7.
68 Refer to Chapter 7, Section 3 and renew the driveshaft oil seals.
69 Do not fill the gearbox with oil until it has been refitted and the driveshafts inserted.



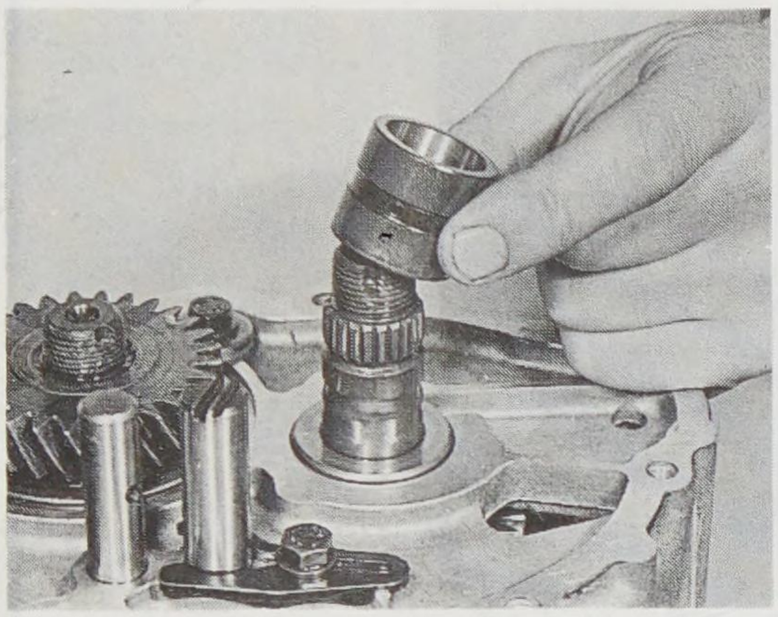
13.44 Bearing retaining circlip



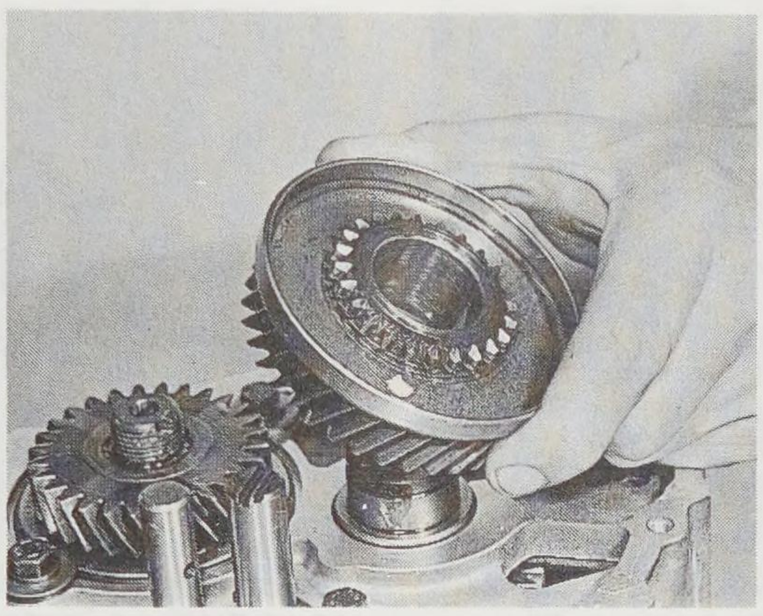
13.45 Tightening bearing retaining bolts



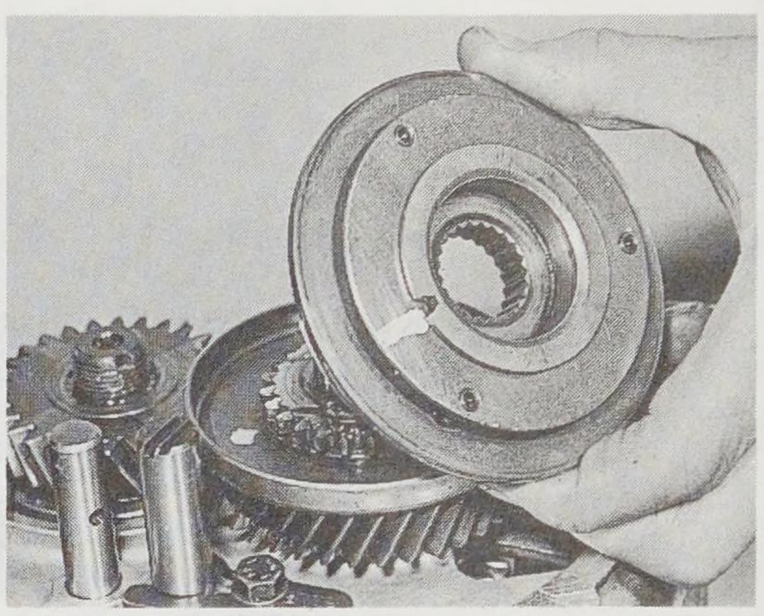
13.46A Fit the spacer ...



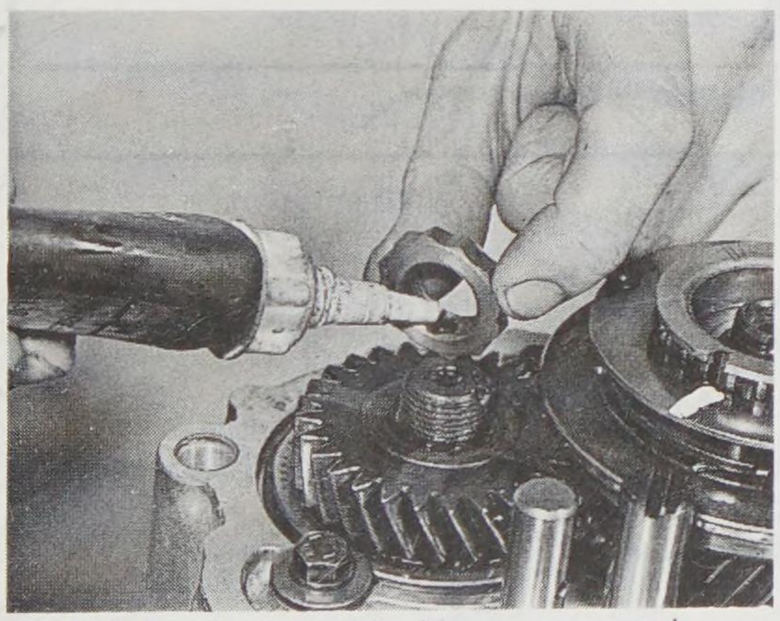
13.46B ... and bush



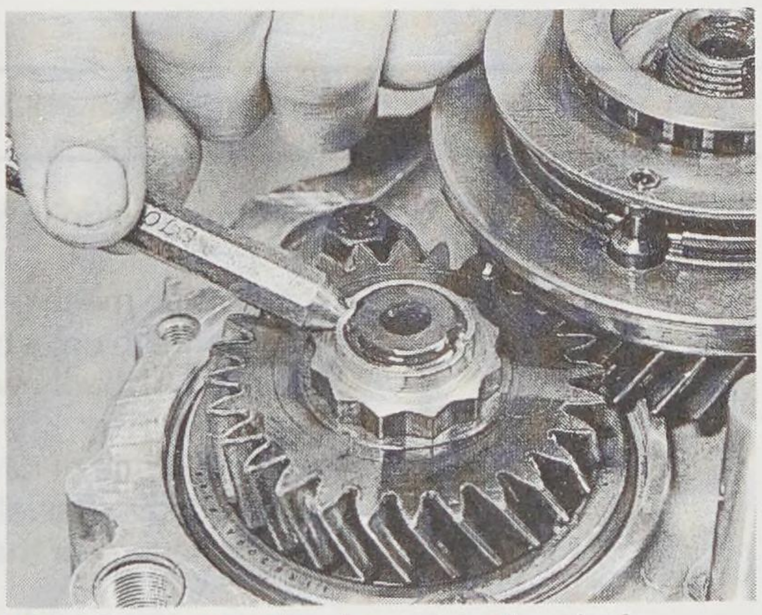
13.47A Slide on 5th gear ...



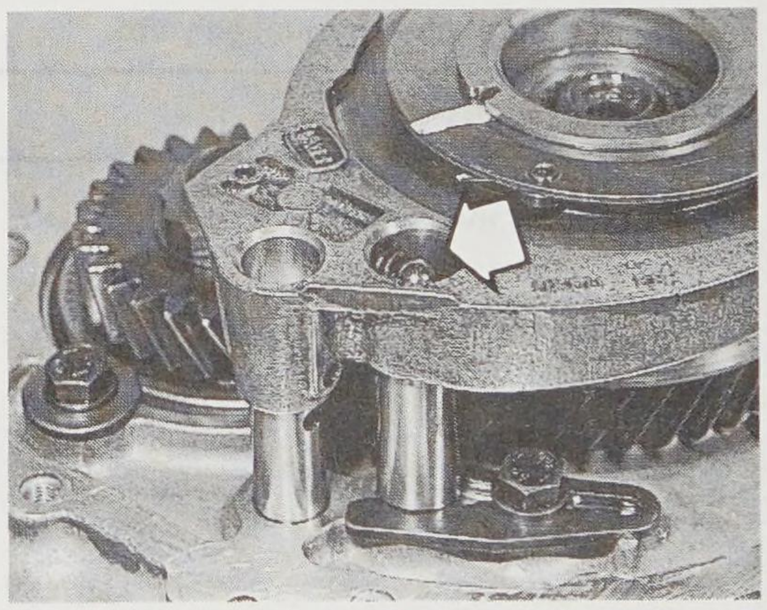
13.47B ... and synchro-hub and sleeve



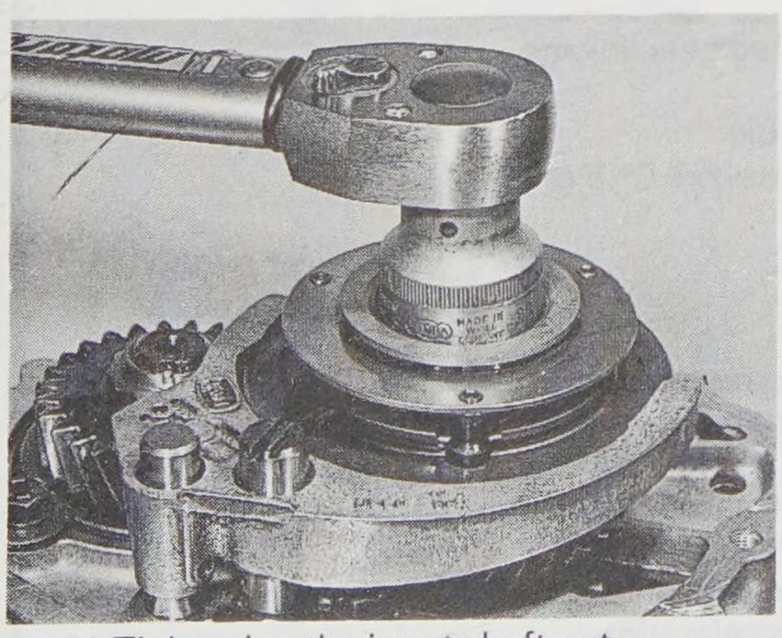
13.48A Apply thread-locking compound ...



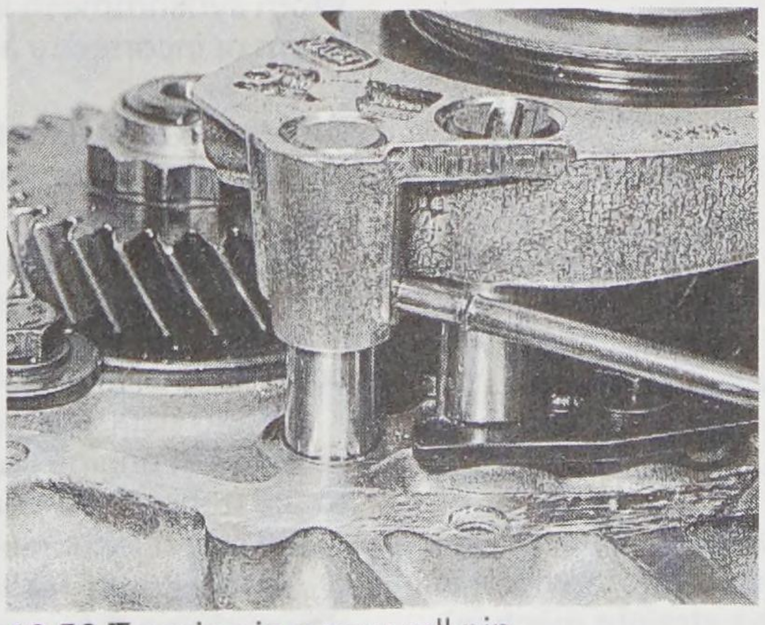
13.48B ... and stake the nut to the shaft



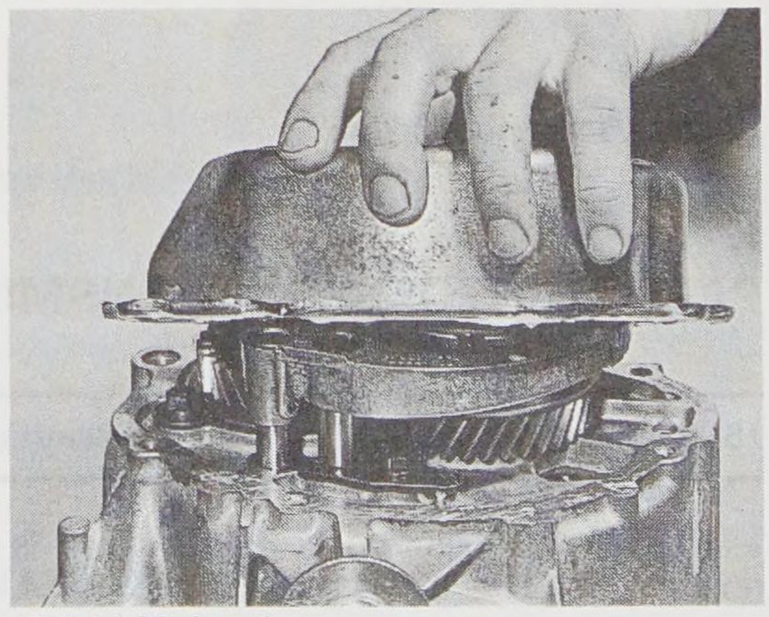
13.50 5th gear selector fork with detent ball and spring arrowed



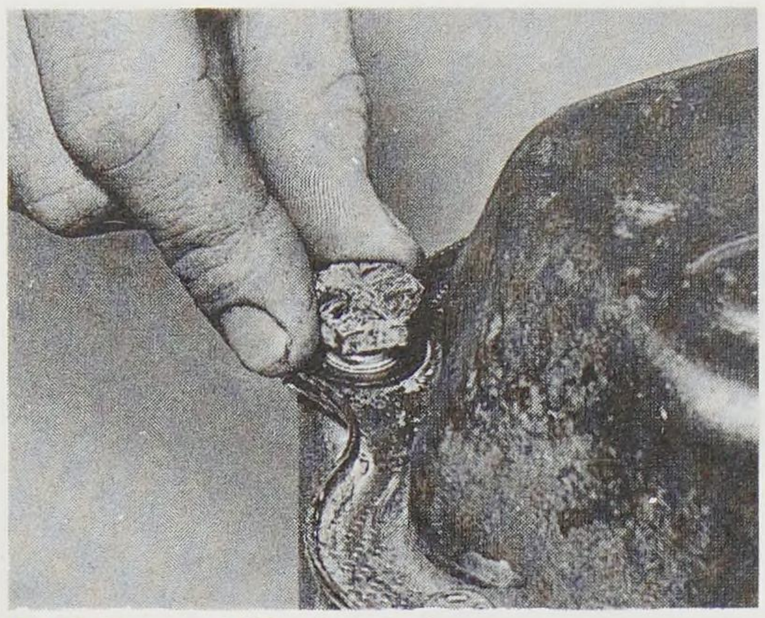
13.52 Tightening the input shaft nut



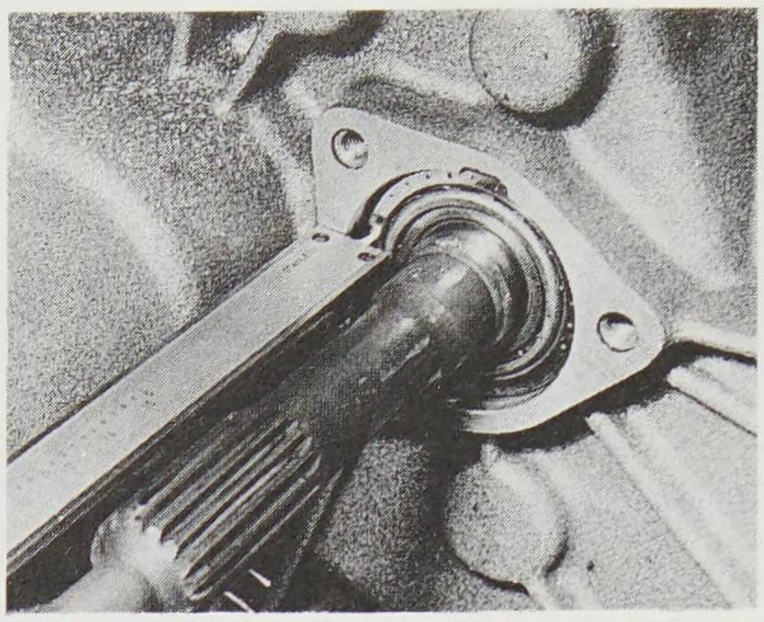
13.53 Tapping in a new roll pin



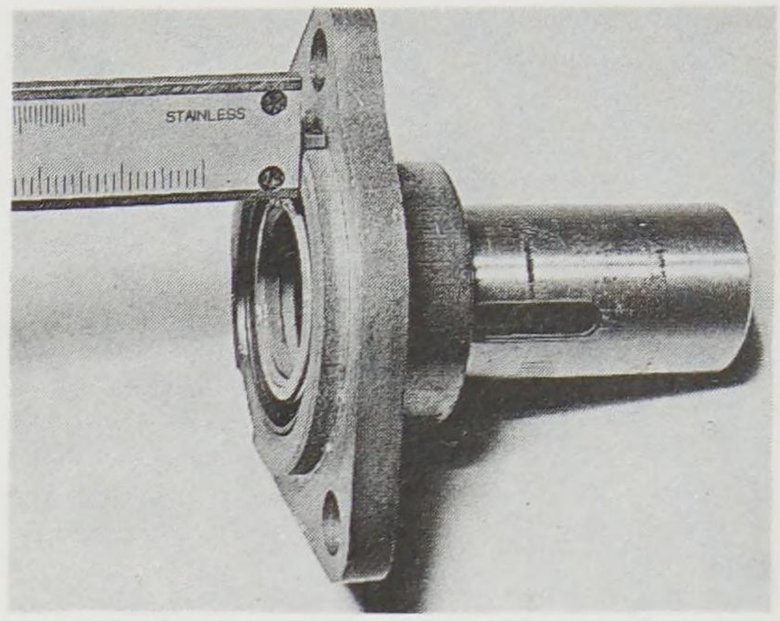
13.54A Fitting the rear cover ...



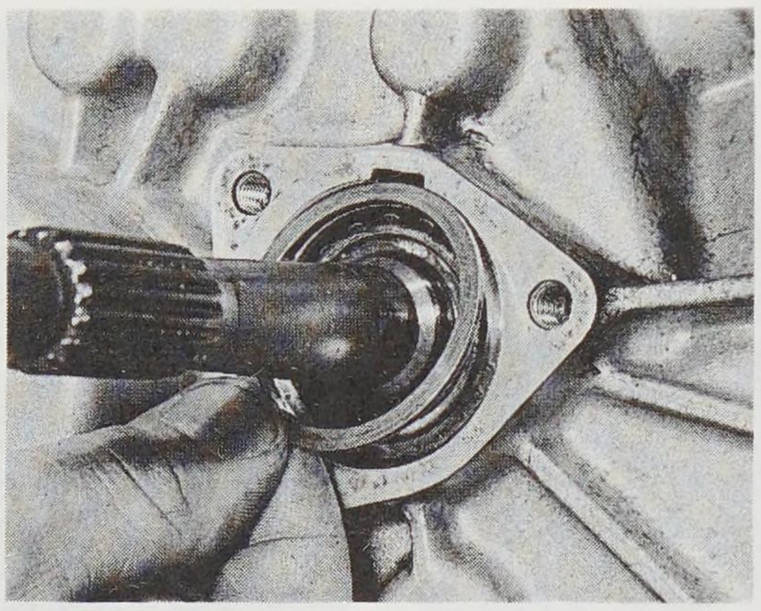
13.54B ... and filler/level plug



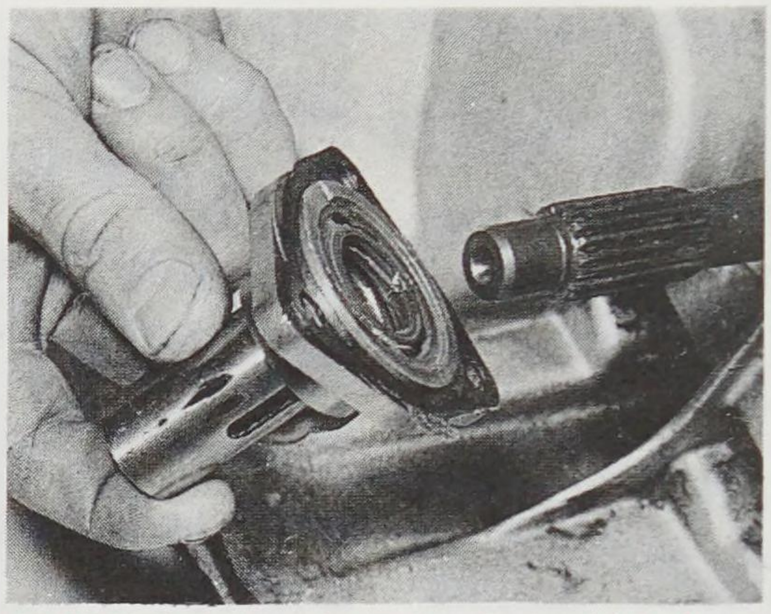
13.61 Measuring the distance from the clutch housing front face to the bearing outer race



13.62 Measuring the distance between the guide tube flange and front face



13.65 Fitting a shim over the input shaft



13.66 Fitting the release bearing guide tube

14 Fault diagnosis – manual gearbox

Symptom	Reason(s)
Weak or ineffective synchromesh	Synchromesh units worn, or damaged
Jumps out of gear	Gearchange mechanism worn Synchromesh units badly worn Selector fork badly worn
Excessive noise	Incorrect grade of oil or oil level too low Gearteeth excessively worn or damaged Intermediate gear thrust bearing worn allowing excessive end play Worn bearings
Difficulty in engaging gears	Clutch pedal adjustment incorrect Worn selector components Worn synchromesh units Worn or incorrectly adjusted gear linkage
Reverse gear unobtainable	Broken reverse release cable

PART B: AUTOMATIC TRANSMISSION

15 General description and safety precautions

The ZF HP14 automatic transmission is a four-speed unit with reverse gear. The 4th gear has a mechanical lock-up system which in effect bypasses the hydraulic torque converter with a straight mechanical drive, reducing the inherent torque loss in the converter. The system is also partially applied to 3rd gear, reducing the losses still further, making the transmission more economical in terms of fuel usage than conventional all-hydraulic transmissions.

Gear change is automatic in use, the transmission responding to changes in engine speed and load. A manual selector lever, connected to the transmission unit by cable allows manual override of the forward gears and selection of reverse.

A 'kickdown' facility, again cable operated, provides fast, automatic down-changes for rapid acceleration.

Automatic Transmission Fluid (ATF) becomes very hot during use and additional cooling for the ATF is provided by a cooling system/ATF fluid heat exchanger mounted on the side of the engine.

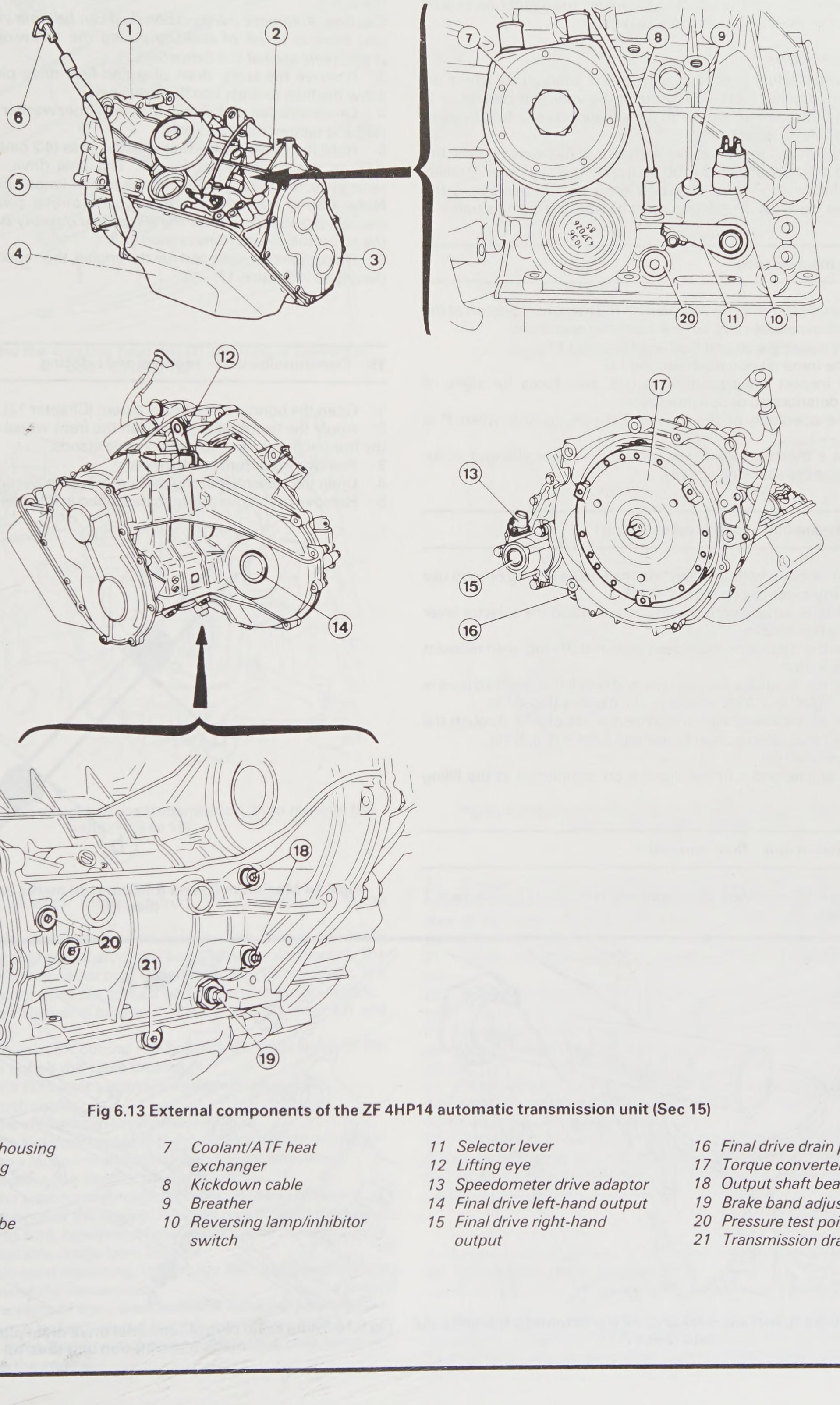


Fig 6.13 External components of the ZF 4HP14 automatic transmission unit (Sec 15)

1 *Converter housing*
2 *Main casing*
3 *End cover*
4 *Sump*
5 *Dipstick tube*
6 *Dipstick*
7 *Coolant/ATF heat exchanger*
8 *Kickdown cable*
9 *Breather*
10 *Reversing lamp/inhibitor switch*
11 *Selector lever*
12 *Lifting eye*
13 *Speedometer drive adaptor*
14 *Final drive left-hand output*
15 *Final drive right-hand output*
16 *Final drive drain plug*
17 *Torque converter*
18 *Output shaft bearing bolts*
19 *Brake band adjuster*
20 *Pressure test points*
21 *Transmission drain plug*

The transmission incorporates a mechanical parking lock which comes into use whenever P is selected. However, the handbrake should still be applied whenever the vehicle is parked.

Safety precautions

The following safety precautions must be adhered to where an automatic transmission is fitted. Whenever the vehicle is parked, or is being serviced or repaired, ensure that the handbrake is fully applied and the selector lever is in P.

If it is necessary to tow a vehicle with automatic transmission, the towing speed must be restricted to 30 mph and the distance to 30 miles. If these conditions cannot be met, or if transmission damage is the reason for seeking a tow, the vehicle must be transported on a trailer.

16 Routine maintenance

At the intervals laid down in the 'Routine maintenance' *Section at the beginning of this manual, carry out the following operations.*

1 Check the transmission unit fluid level (Section 17).
2 Renew the transmission fluid (Section 18).
3 Carefully inspect the transmission unit joint faces for signs of leakage, and deteriorated or damaged seals.
4 Check the operation of the mechanical parking lock when P is selected.
5 Carry out a thorough road test, ensuring all gear changes occur smoothly and at the specified speeds.

17 Transmission unit – fluid level checking

1 This must be done with the fluid hot, the engine having been in use for at least thirty minutes prior to the check.
2 Park on a level surface with the engine idling and the selector lever in P. Apply the handbrake.
3 Withdraw the dipstick, wipe it clean on non-fluffy rag, then re-insert it in the dipstick tube.
4 Withdraw the dipstick a second time and check that the fluid level is between the 'MAX' and 'MIN' marks on the dipstick (Fig. 6.14).
5 Replenish as necessary with the correct grade of ATF through the dipstick guide tube, using a clean funnel and beaker (Fig. 6.15).
Caution: *Do not overfill.*
6 Stop the engine and refit the dipstick on completion of the filling operation.

18 Transmission unit – fluid renewal

1 Before the fluid is drained, the conditions in Section 17, paragraph 1 must be in force.
2 Position a suitable container of minimum 3.0 litre (5.2 pints) under the sump.
Caution: *Automatic transmission fluid can become very hot during use and there is a risk of scalding during the following operation. Take precautions against this happening.*
3 Remove the sump drain plug and final drive plug (Fig. 6.16) and allow the fluid to drain into the container.
4 On completion of draining, fit new copper washer to the drain plugs, refit and tighten them securely.
5 Refill the transmission unit with 2.4 litres (4.2 pints) of the specified ATF as described in Section 17. The final drive, although drained separately, is filled together with the transmission unit.
Note: *During normal fluid renewal the torque converter cannot be drained, which accounts for the lesser fluid quantity being required than the actual total in the transmission unit.*
6 On completion, start and run the engine, then check the fluid level as described in Section 17.

19 Transmission unit – removal and refitting

1 Open the bonnet to its fullest extent (Chapter 12).
2 Apply the handbrake and loosen the front wheel nuts, then jack up the front of the car and support on axle stands.
3 Remove both front roadwheels.
4 Drain the transmission fluid as described in Section 18.
5 Remove both driveshafts as described in Chapter 7.

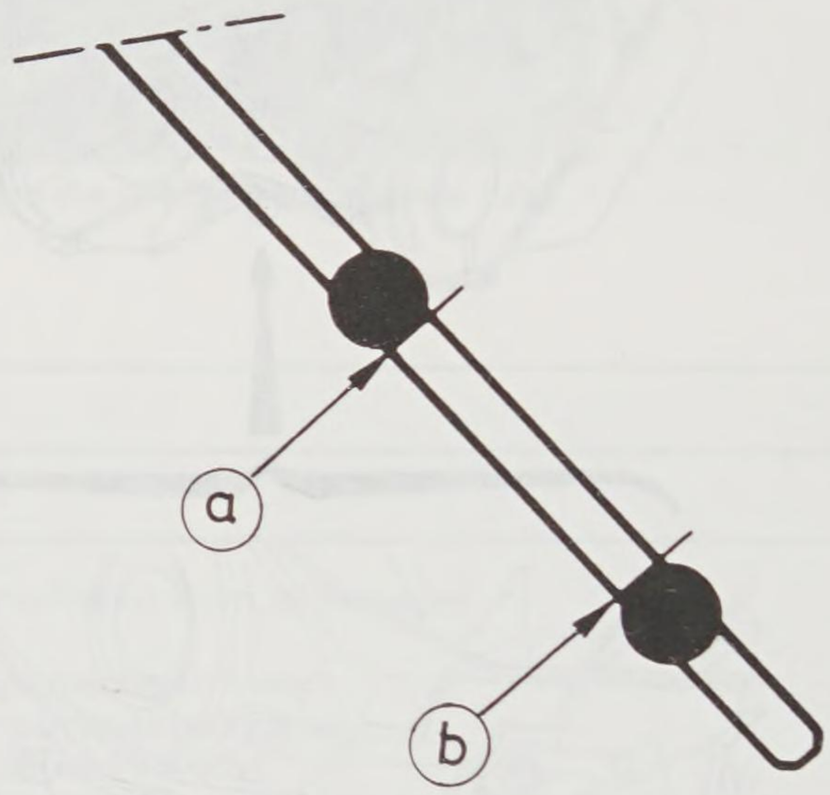


Fig 6.14 Maximum (a) and minimum (b) marks on ATF dipstick (Sec 17)

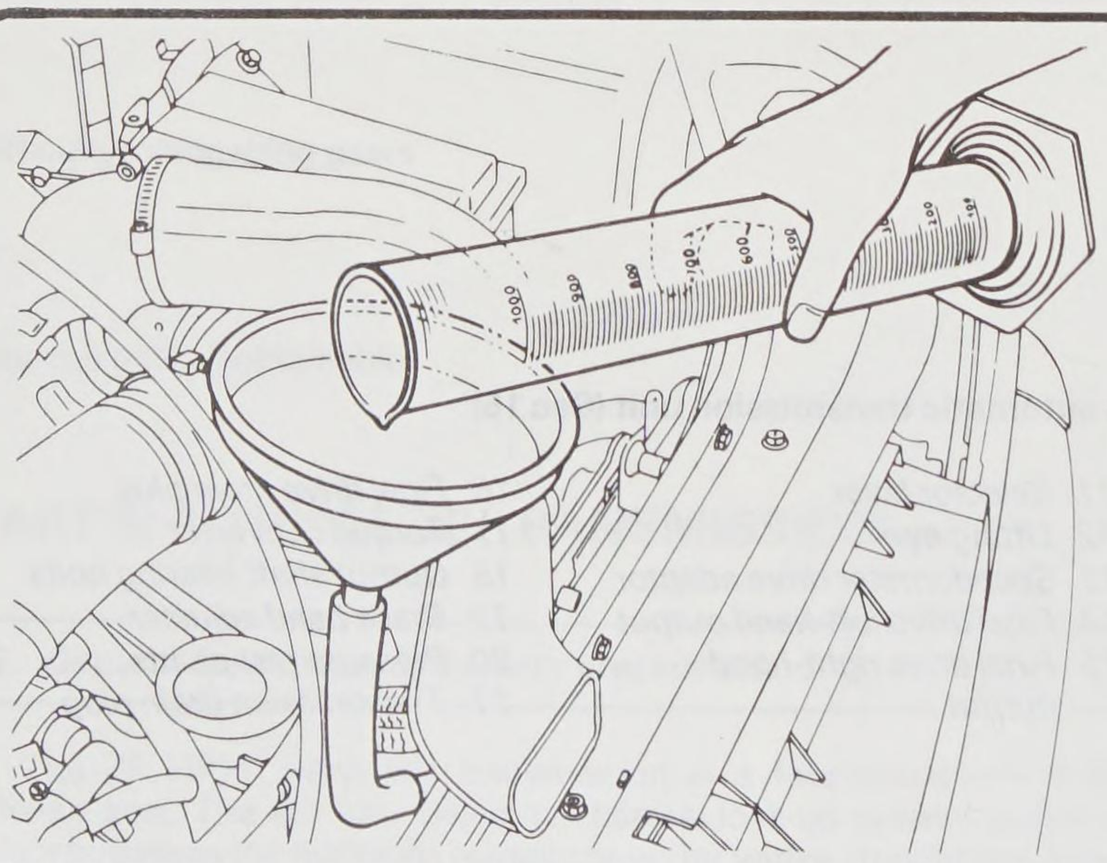


Fig 6.15 Using a funnel and beaker to fill the automatic transmission unit (Sec 17)

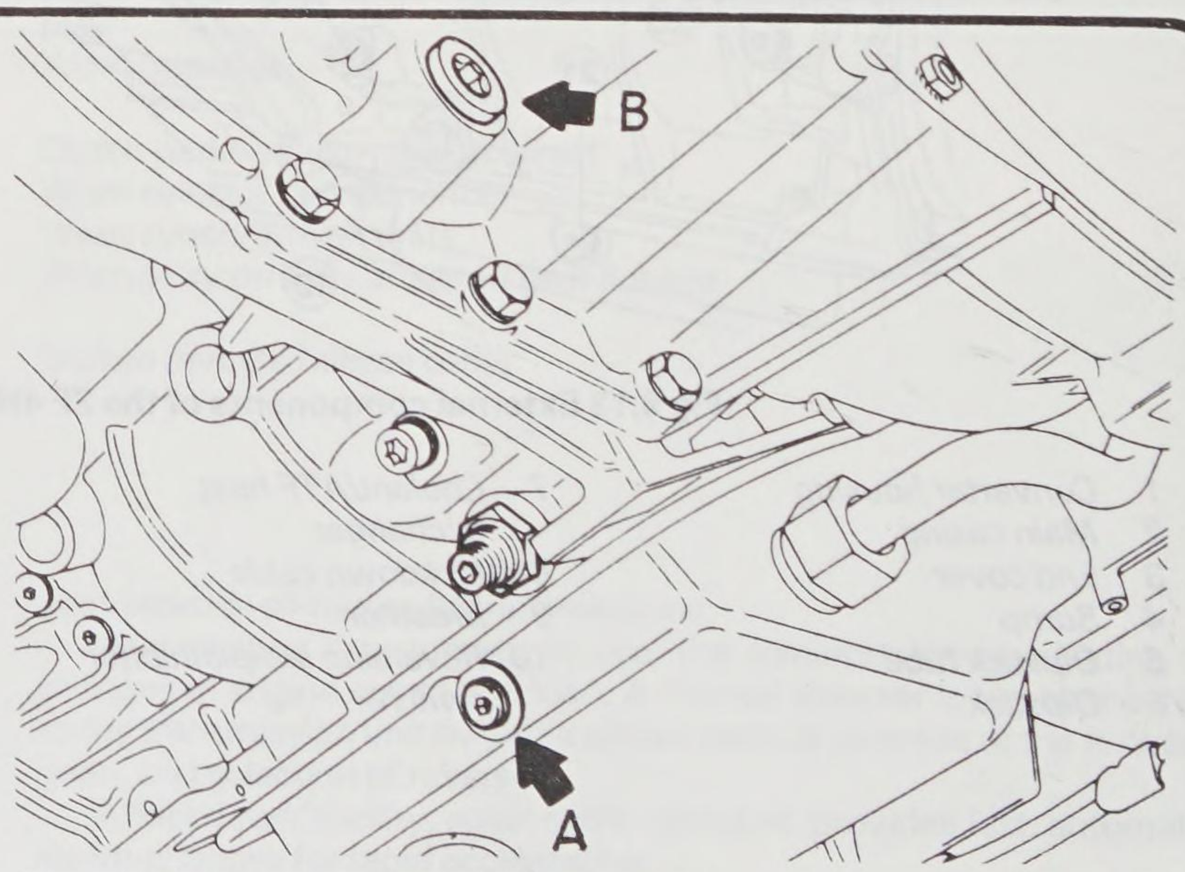


Fig 6.16 Sump drain plug (A) and final drive drain plug (B) on 4HP14 automatic transmission unit (Sec 18)

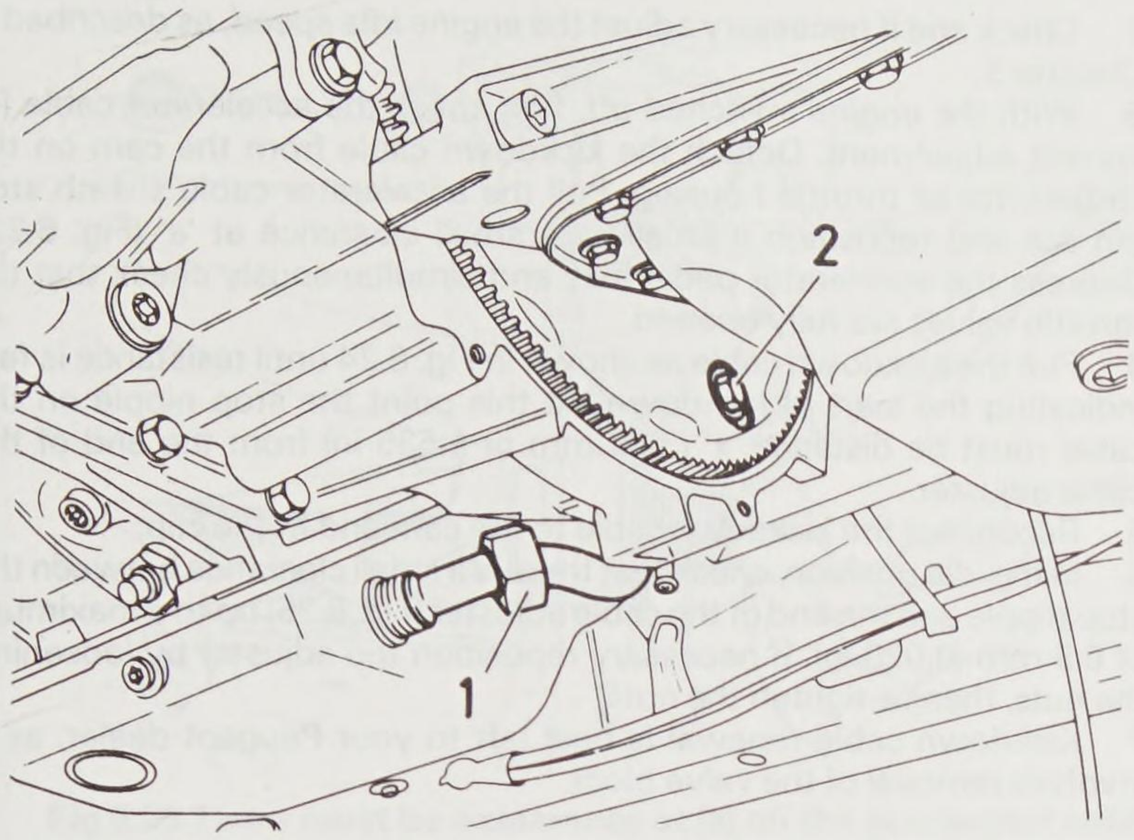


Fig 6.17 Unscrew the dipstick tube nut (1) and torque converter bolts (2) (Sec 19)

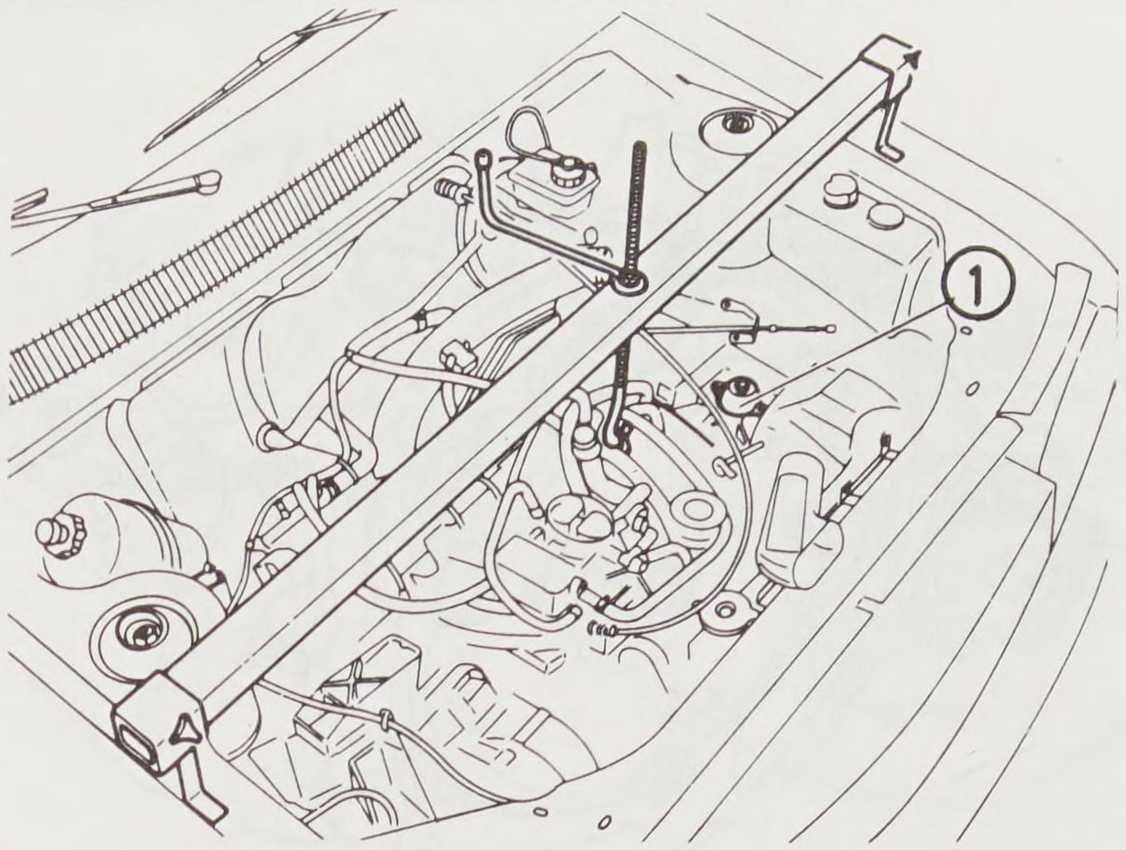


Fig 6.18 Using an engine support bar (Sec 19)

1 Left-hand mounting

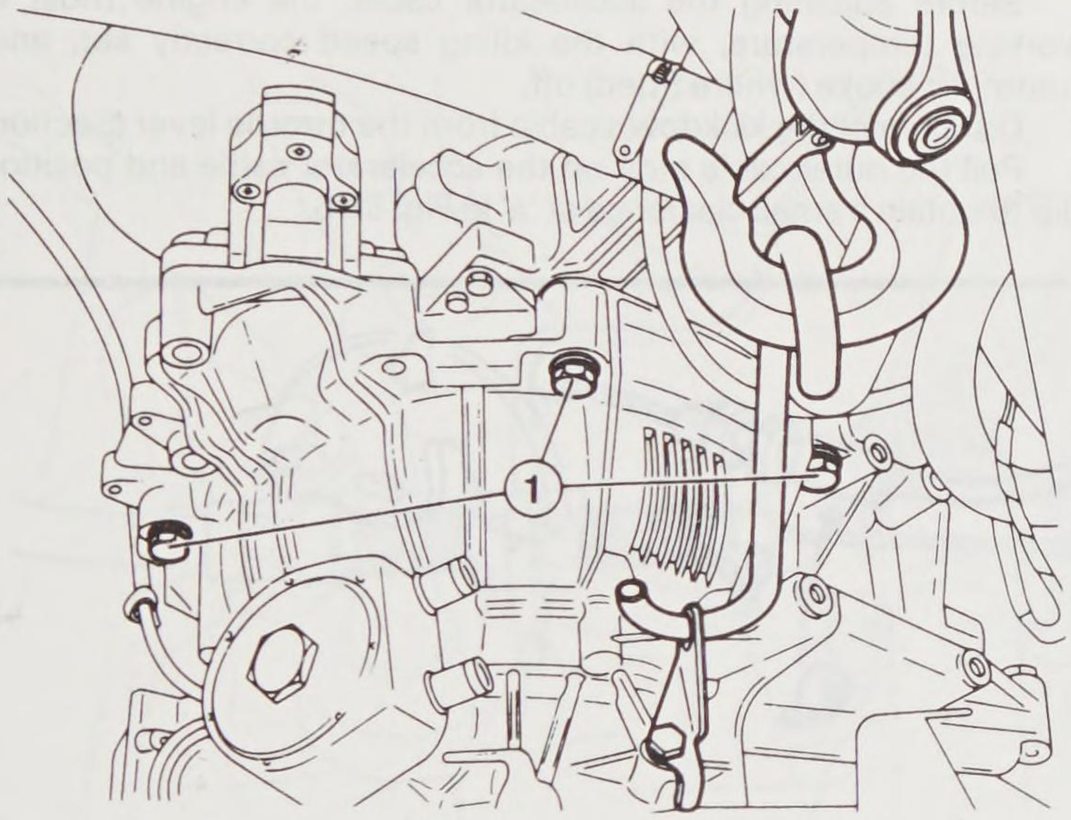


Fig 6.19 Support the weight of the transmission, then remove the bolts (1) (Sec 19)

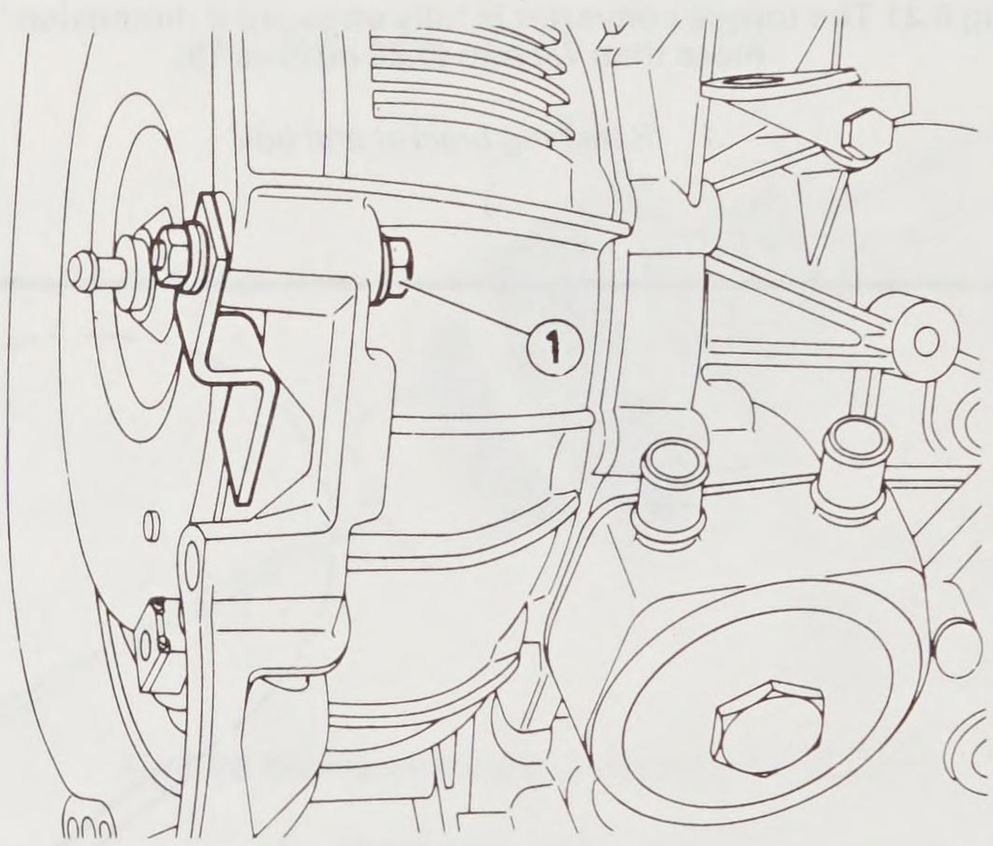


Fig 6.20 Bracket and bolt (1) for holding torque converter in transmission housing (Sec 19)

6 Unscrew the dipstick tube nut from the transmission sump (Fig. 6.17).

7 Unbolt the driveplate cover, then unscrew the torque converter bolts while holding the crankshaft pulley bolt with a bar and socket. The pulley may have a plastic cover on it which must first be removed. The three torque converter bolts are spaced equally around the driveplate.

8 Remove the air cleaner (Chapter 3), the battery (Chapter 12) and battery tray (Chapter 11).

9 Disconnect the selector control rod balljoint from the lever on the transmission, then unbolt the cable bracket.

10 Disconnect the fluid hoses from the cooler and plug them.

11 Unbolt the earth cables.

12 Disconnect the wiring from the inhibitor switch.

13 Disconnect the kickdown cable at the carburettor or throttle housing end, wind it into a loose coil and attach it to the transmission.

14 Unbolt and remove the dipstick tube and bracket.

15 Disconnect the speedometer cable and unbolt the TDC sensor.

16 Support the weight of the engine. Peugeot recommend the use of a bar as shown in Fig. 6.18, however, a hoist may be used or alternatively a trolley jack and suitable cradle from below.

17 Unbolt the left-hand mounting, then lower the engine sufficiently to allow for removal of the transmission.

18 Support the weight of the transmission. A hoist may be used as shown in Fig. 6.19 or a trolley jack and suitable cradle from below.

19 Unscrew the three hexagon and single socket head bolts securing the transmission to the engine.

20 Separate the transmission from the engine while making sure that the torque converter remains engaged with the transmission. When clear of the engine, fit a bracket as shown in Fig. 6.20 to hold the torque converter in place.

21 Lower the transmission to the floor and remove it from under the car.

22 Before refitting the transmission, check the condition of the spigot bush in the rear of the crankshaft, and apply a little grease to aid entry of the torque converter. Also check that the two locating dowels are in place on the engine. Apply a little grease to the differential/driveshaft seals.

23 Make sure that the torque converter is fully engaged by checking the dimension shown in Fig. 6.21. If necessary rotate the torque converter until it is correctly engaged.

24 Refitting is a reversal of removal but tighten all nuts and bolts to the specified torque, and adjust the kickdown cable and selector control. Fill the transmission as described in Section 17 and bleed the cooling system with reference to Chapter 2.

20 Kickdown cable – adjustment

1 The kickdown cable checks and adjustments must be made with the engine at normal operating temperature, the electric cooling fan having cut in, then off and the automatic choke off (where fitted).

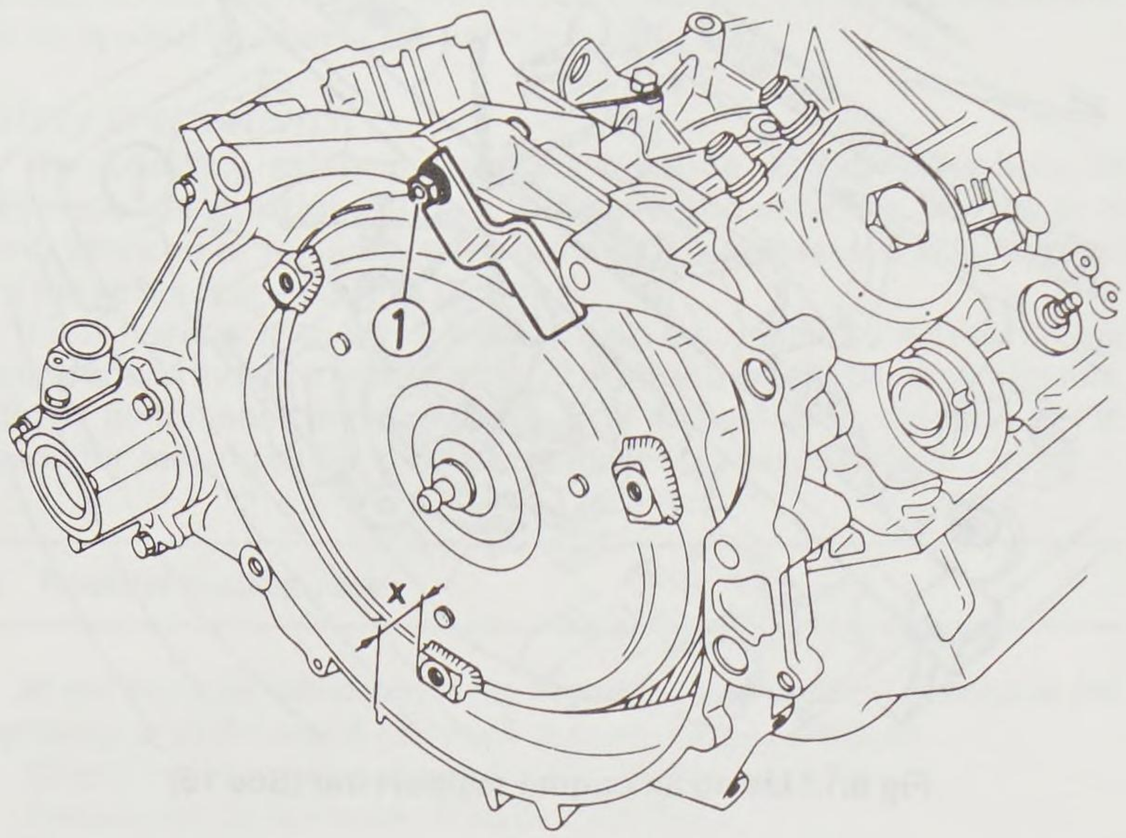


Fig 6.21 The torque converter is fully engaged if dimension 'X' is more than 7.0 mm (0.28 in) (Sec 19)

1 Retaining bracket and bolt

2 Check and if necessary adjust the engine idle speed, as described in Chapter 3.
3 With the engine switched off, first check the accelerator cable for correct adjustment. Detach the kickdown cable from the cam on the carburettor or throttle housing. Pull the accelerator cable sheath stop pin out and reposition it to allow a small clearance at 'a' (Fig. 6.23). Depress the accelerator pedal fully and simultaneously check that the throttle valves are fully opened.
4 Pull the kickdown cable as shown in Fig. 6.24 until resistance is felt, indicating the start of kickdown. At this point the stop nipple on the cable must be distance 'x' (39.0 mm or 1.535 in) from the end of the cable adjuster.
5 Reconnect the kickdown cable to the cam and fit the clip.
6 In the idle position, check that there is a small clearance between the stop nipple and the end of the cable adjuster (Fig. 6.25) up to a maximum of 0.5 mm (0.020 in). If necessary reposition the adjuster by loosening the nuts, then re-tighten the nuts.
7 Kickdown cable renewal is best left to your Peugeot dealer, as it involves removal of the valve block.

21 Accelerator cable – adjustment

1 Before adjusting the accelerator cable, the engine must be at working temperature, with the idling speed correctly set, and the automatic choke (where fitted) off.
2 Disconnect the kickdown cable from the throttle lever (Section 20).
3 Pull the outer cable stop on the accelerator cable and position the clip to obtain a small clearance at 'a' in Fig. 6.26.

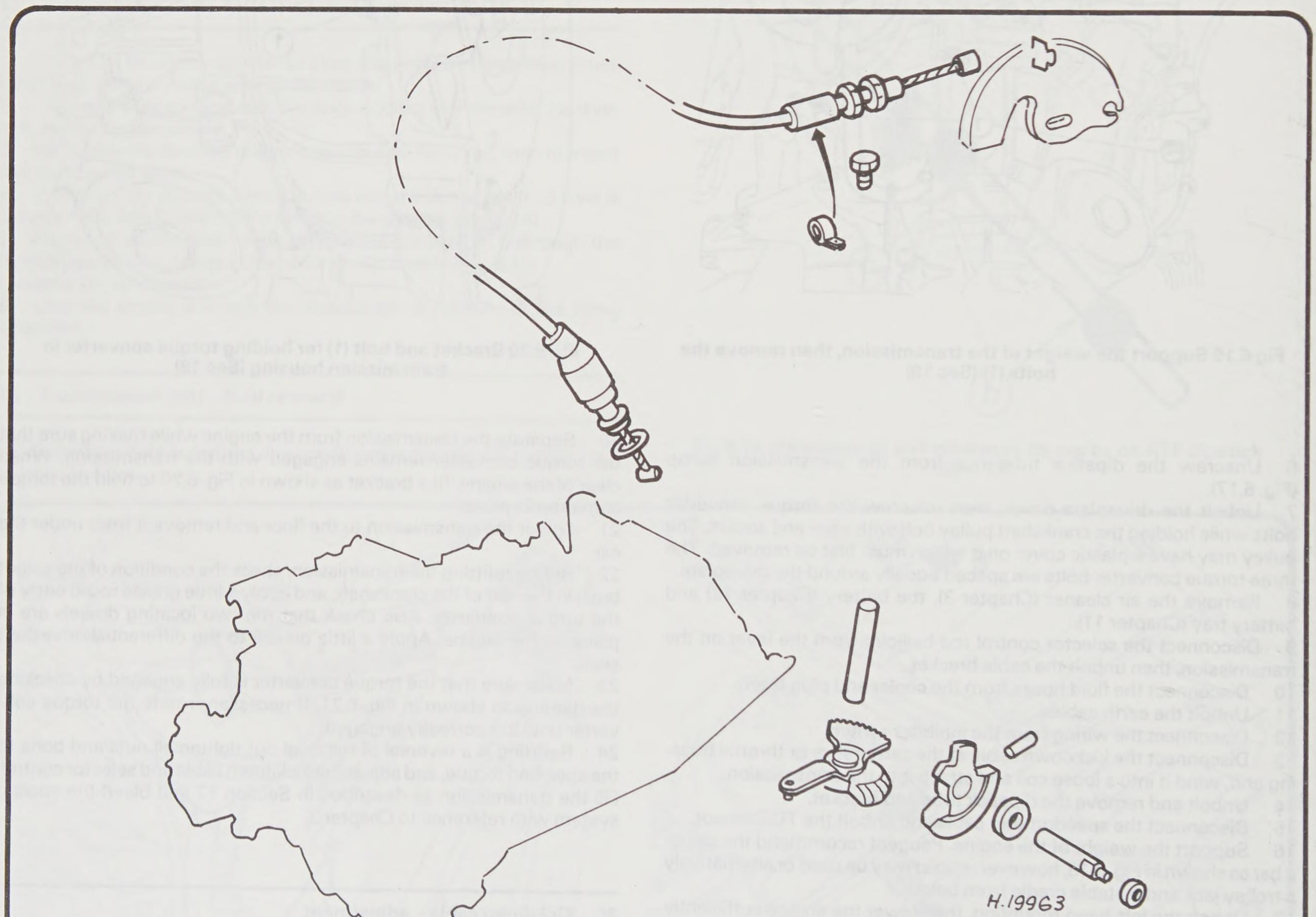


Fig 6.22 Kickdown cable and associated components (Sec 20)

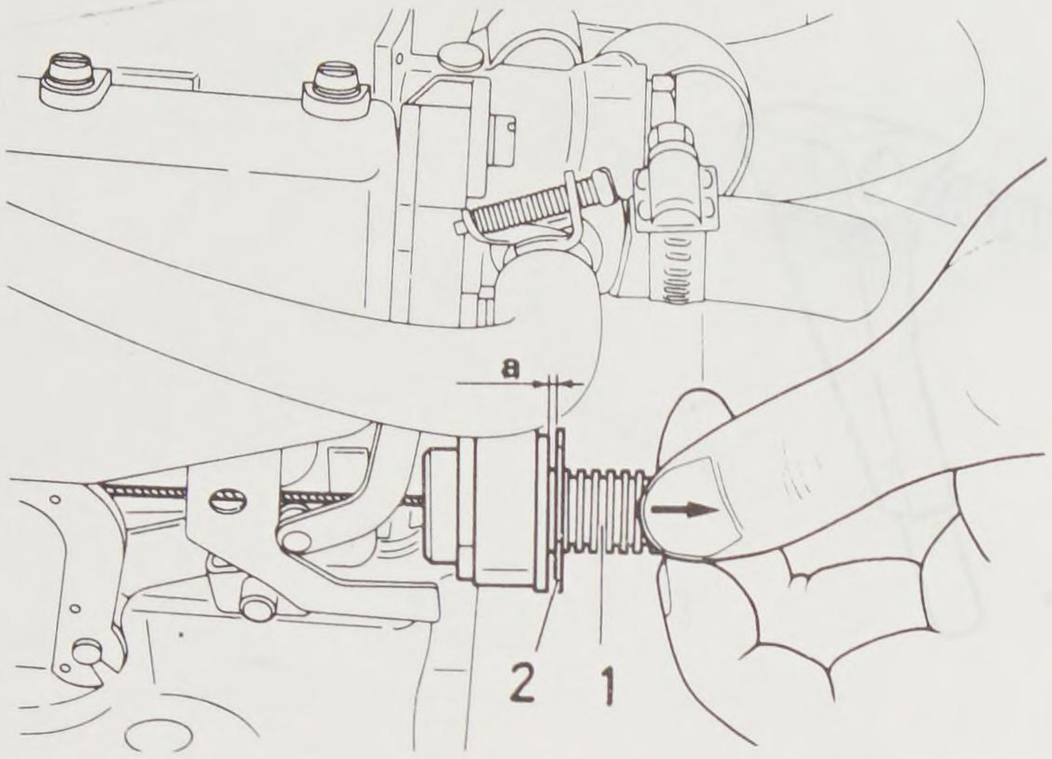


Fig 6.23 There must be a clearance at (a) on the accelerator cable before adjusting the kickdown cable (Sec 20)

1 Adjustment ferrule 2 Stop pin

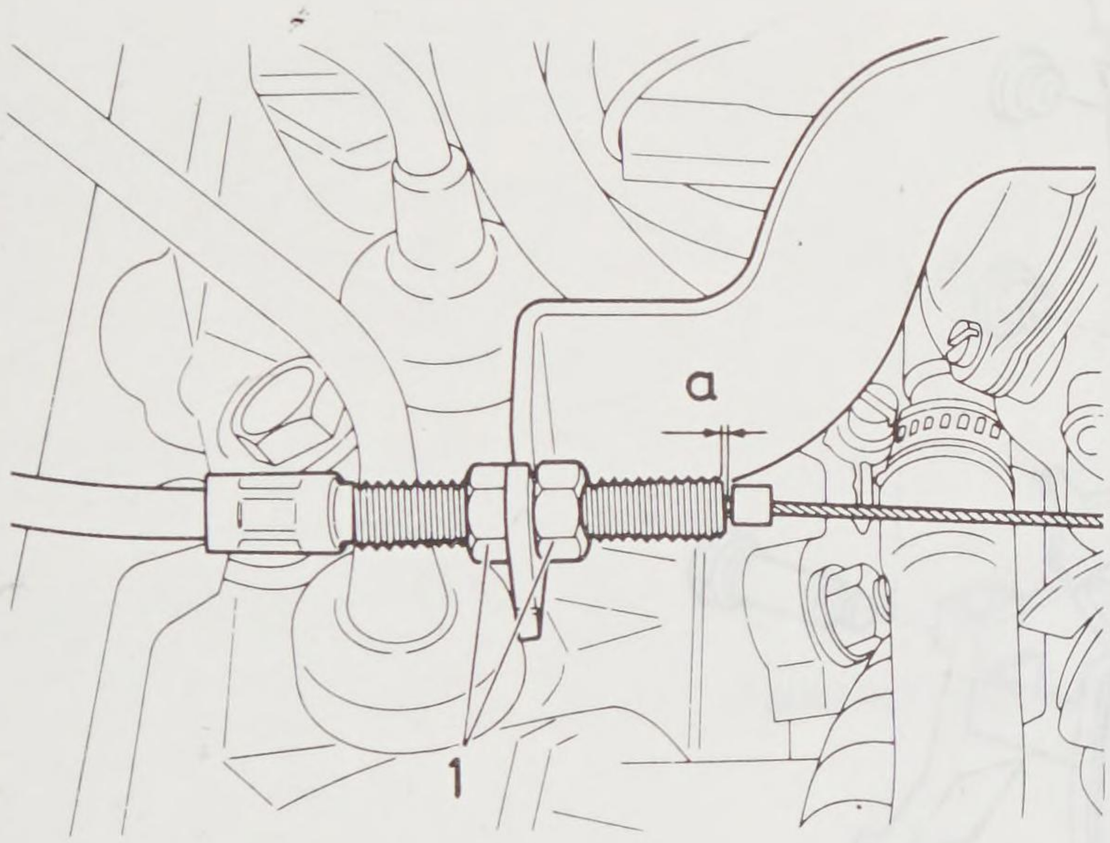


Fig 6.25 Checking idle clearance (a) on the kickdown cable (Sec 20)

1 Adjustment nuts

4 Fully depress the accelerator pedal and check that the throttle butterfly is fully open.
5 Refit the kickdown cable and check its adjustment as described in Section 20.

22 Accelerator cable – renewal

The procedure is as described in Chapter 3, Section 11, but on completion adjust the accelerator cable as described in Section 21 and the kickdown cable as described in Section 20.

23 Selector lever – removal and refitting

1 Removal of the selector lever involves removal of the centre floor console as described in Chapter 11, then disconnection of the cable from the lever and unbolting of the assembly from the floor panel.
2 An exploded view of the lever assembly appears in Fig. 6.27.
3 Refit the lever in reverse and adjust the selector cable as described in Section 24.

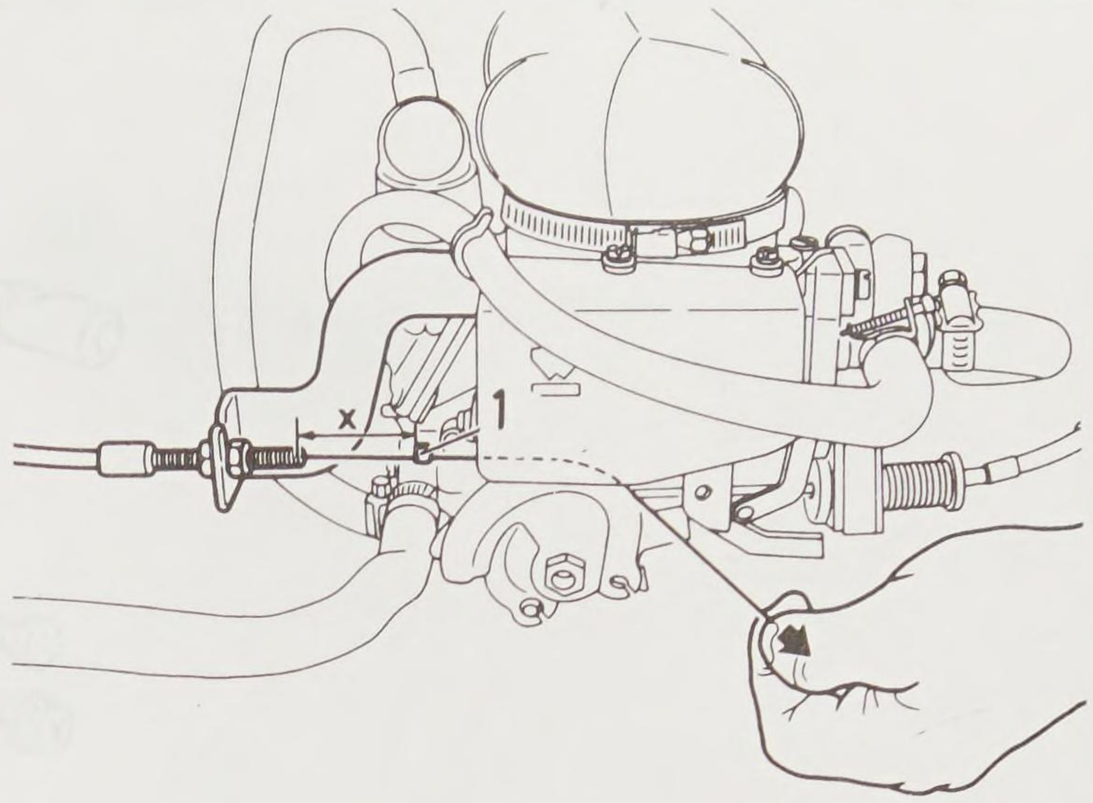


Fig 6.24 Checking the position of the stop nipple (1) on the kickdown cable (Sec 20)

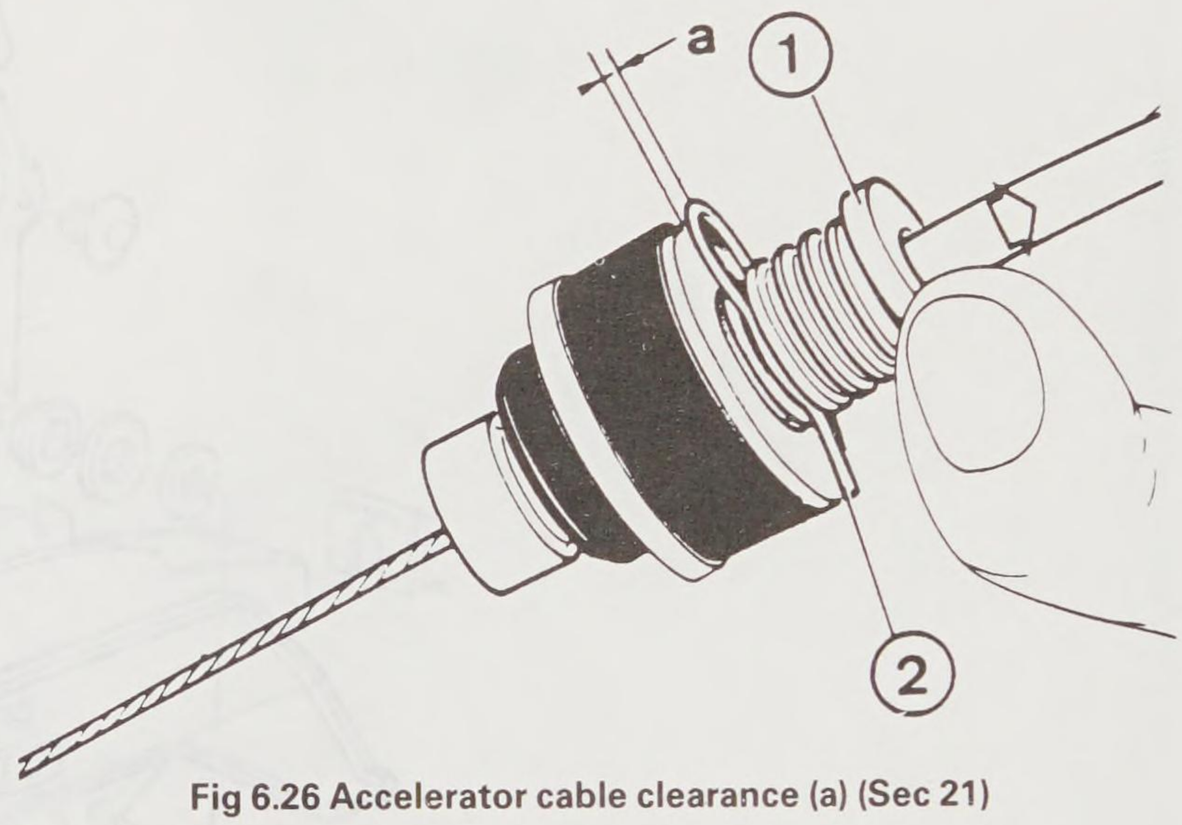


Fig 6.26 Accelerator cable clearance (a) (Sec 21)

1 Outer cable stop 2 Clip

24 Selector cable – adjustment

1 Remove the air cleaner as described in Chapter 3, then using a spanner as shown in Fig. 6.29, disconnect the control rod balljoint from the lever on the transmission unit.
2 Move the lever on the transmission unit fully forwards to the P position.
3 Inside the car, move the selector lever fully forwards to the P position.
4 The control rod balljoint should align exactly with the coupling ball on the selector lever so that when reconnected, neither the selector lever within the vehicle nor the selector lever on the transmission unit move. Adjust the position of the balljoint on the connecting rod if necessary.
5 If the selector control was adjusted, check the setting by starting the engine and, when it has reached its normal operating temperature, move the selector lever within the vehicle to P. The vehicle should be stationary and the parking lock fully engaged.
6 Now move the lever to R with the handbrake off. The vehicle should move rearwards, the parking lock having been released.
7 If either of the checks in paragraphs 5 and 6 is unsatisfactory, unscrew the control rod balljoint one complete turn and repeat the checks until satisfactory.
8 Refit the air cleaner.
9 To renew the selector cable, disconnect it from the selector lever on the transmission unit and the gear selector lever inside the vehicle, then feed it through the bulkhead grommet.
10 Refit in reverse and adjust the cable as described earlier.

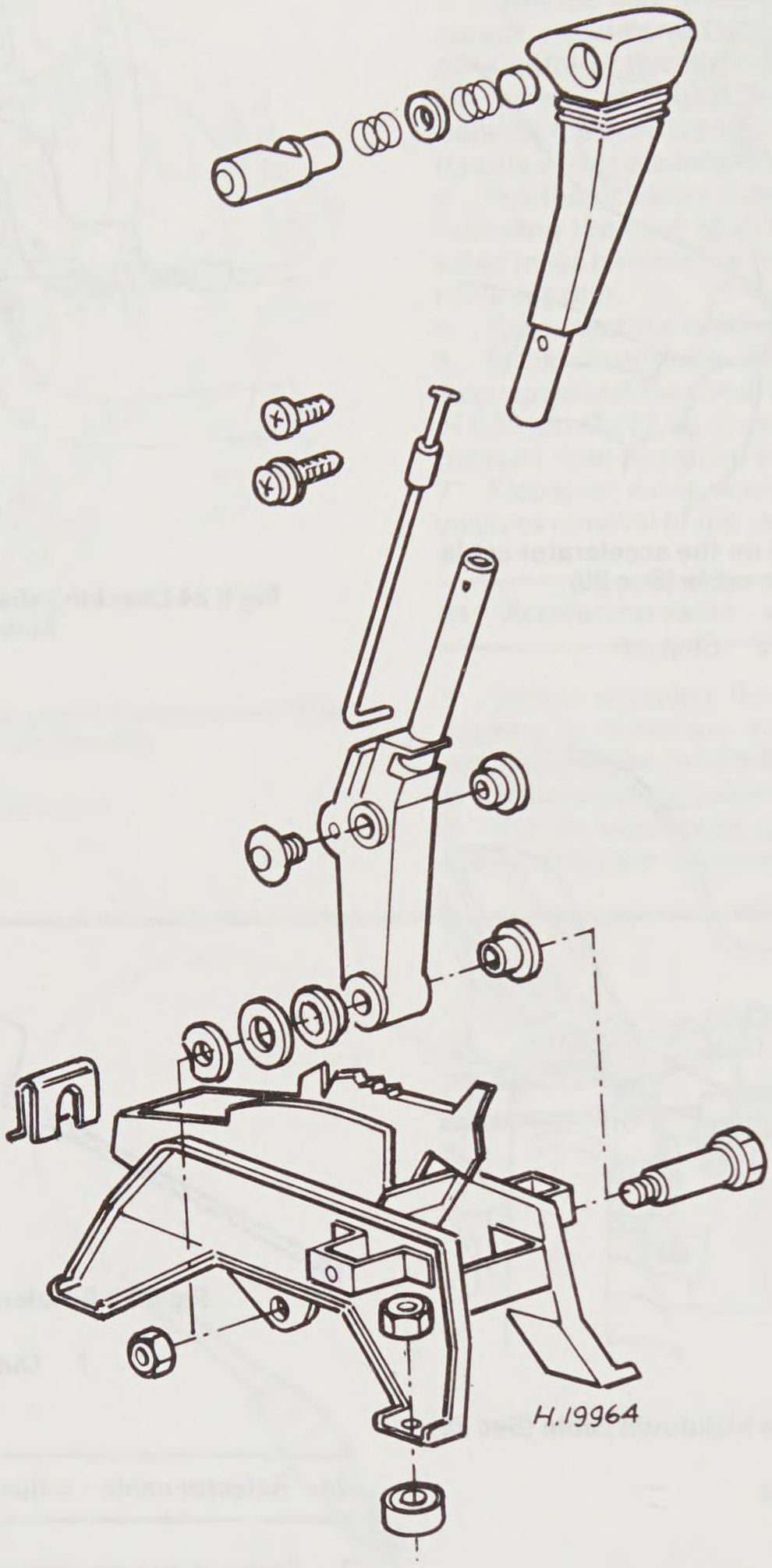


Fig 6.27 Exploded view of selector lever (Sec 23)

25 Reversing lamp/starter inhibitor switch – removal and refitting

1 The switch is located on the side of the transmission unit just above the selector lever.
2 To remove the switch, disconnect the leads on the switch and unscrew the switch from the transmission housing.
3 Refit in reverse using a new sealing washer.

26 Brake band – adjustment

1 This operation should only be carried out if the existing adjustment is suspect or if there has been a fluid leak.
2 Loosen the locknut on the adjuster bolt (Fig. 6.30).
3 Tighten the bolt to 10 Nm (7 lbf ft).
4 Unscrew the bolt by two complete turns.
5 Tighten the locknut without disturbing the adjuster bolt.

27 Coolant/ATF heat exchanger – removal and refitting

1 Remove the air cleaner as described in Chapter 3.
2 Clamp the coolant hoses as close as is possible to the heat exchanger, then disconnect them from the heat exchanger.
3 Unscrew the heat exchanger securing bolt and withdraw the unit, keeping the coolant pipe connections facing upward to prevent any spillage of coolant entering the transmission.
4 Renew the seals on the heat exchanger face and the O-ring seal under its securing bolt (Fig. 6.32). Lightly lubricate the seals with ATF.
5 Fit the heat exchanger with the coolant pipe connections facing upward.
6 Fit and tighten the securing bolt to the specified torque.
7 Re-connect the coolant hoses and remove the clamps.
8 Refit the air cleaner.
9 Fill and bleed the cooling system as described in Chapter 2.
10 Run the engine up to working temperature, then check for coolant and ATF leaks. Check the ATF level as described in Section 17.

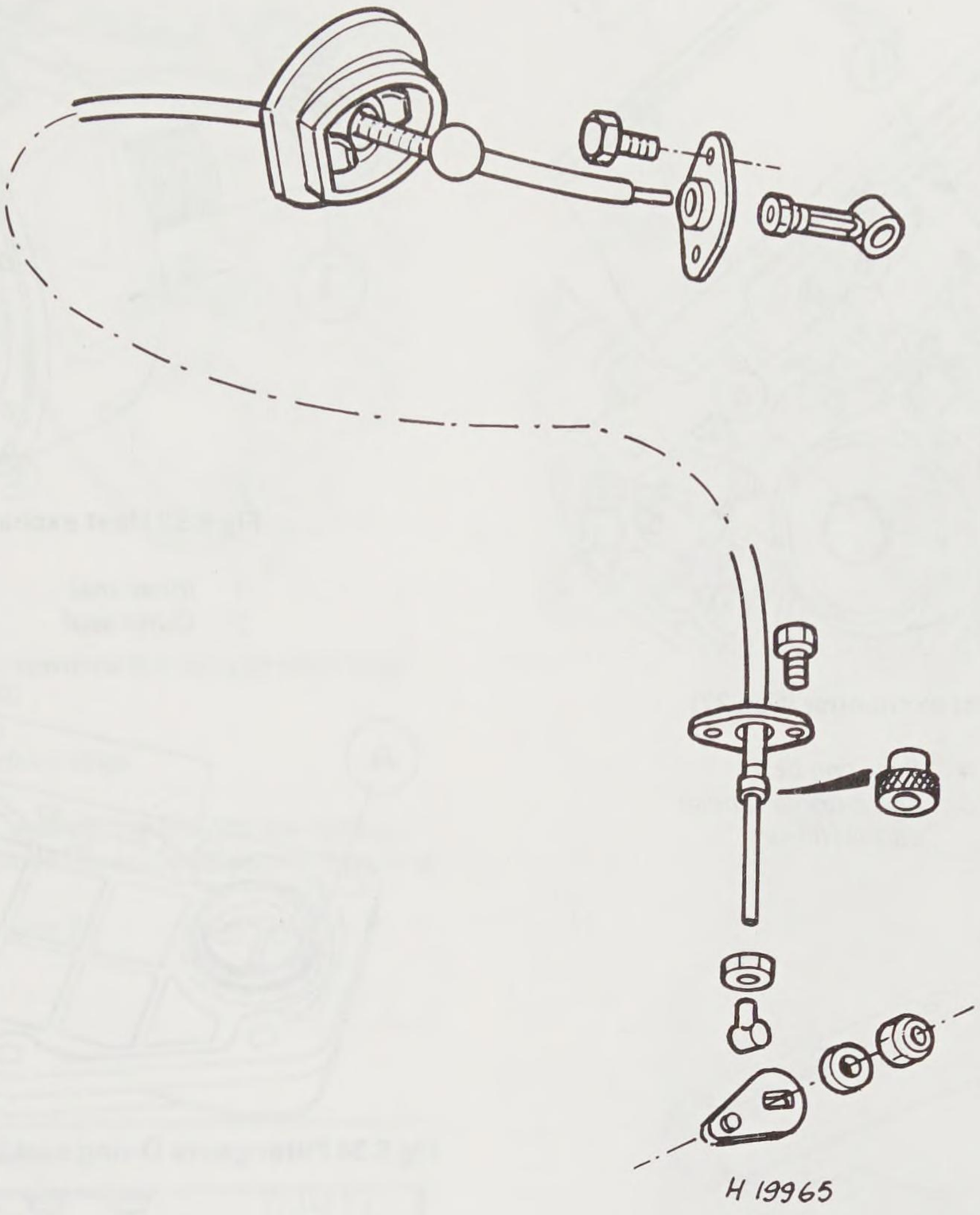


Fig 6.28 Components of the selector cable (Sec 24)

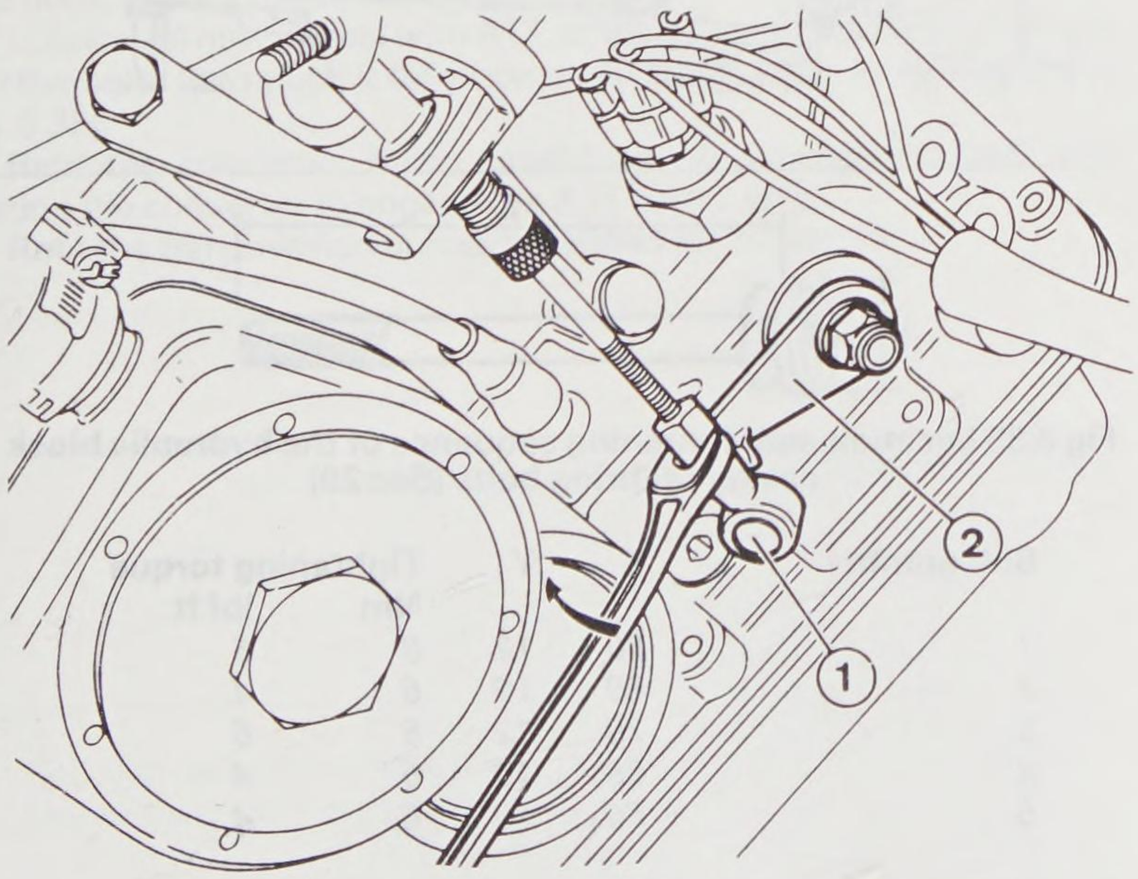


Fig 6.29 Disconnecting the selector control rod balljoint (1) from the transmission lever (2) (Sec 24)

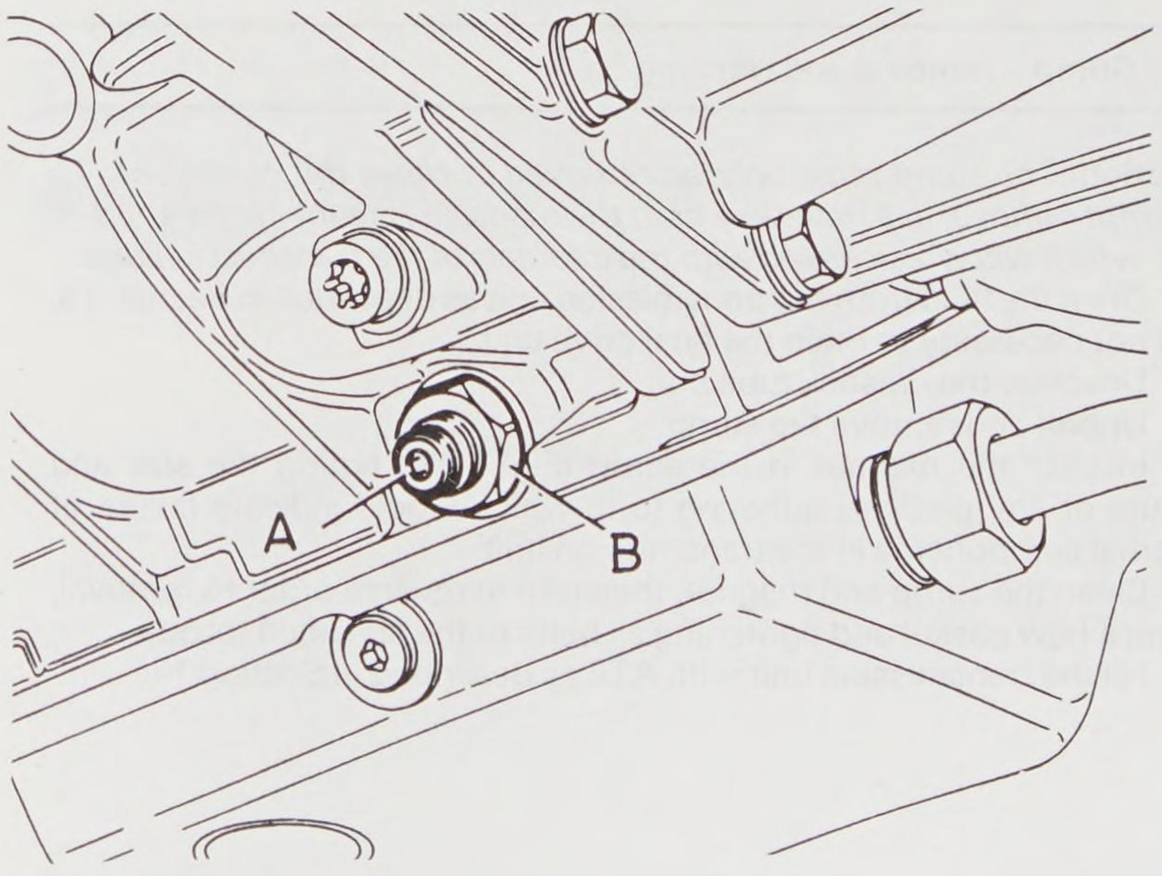


Fig 6.30 Brake band adjustment bolt (A) and locknut (B) (Sec 26)

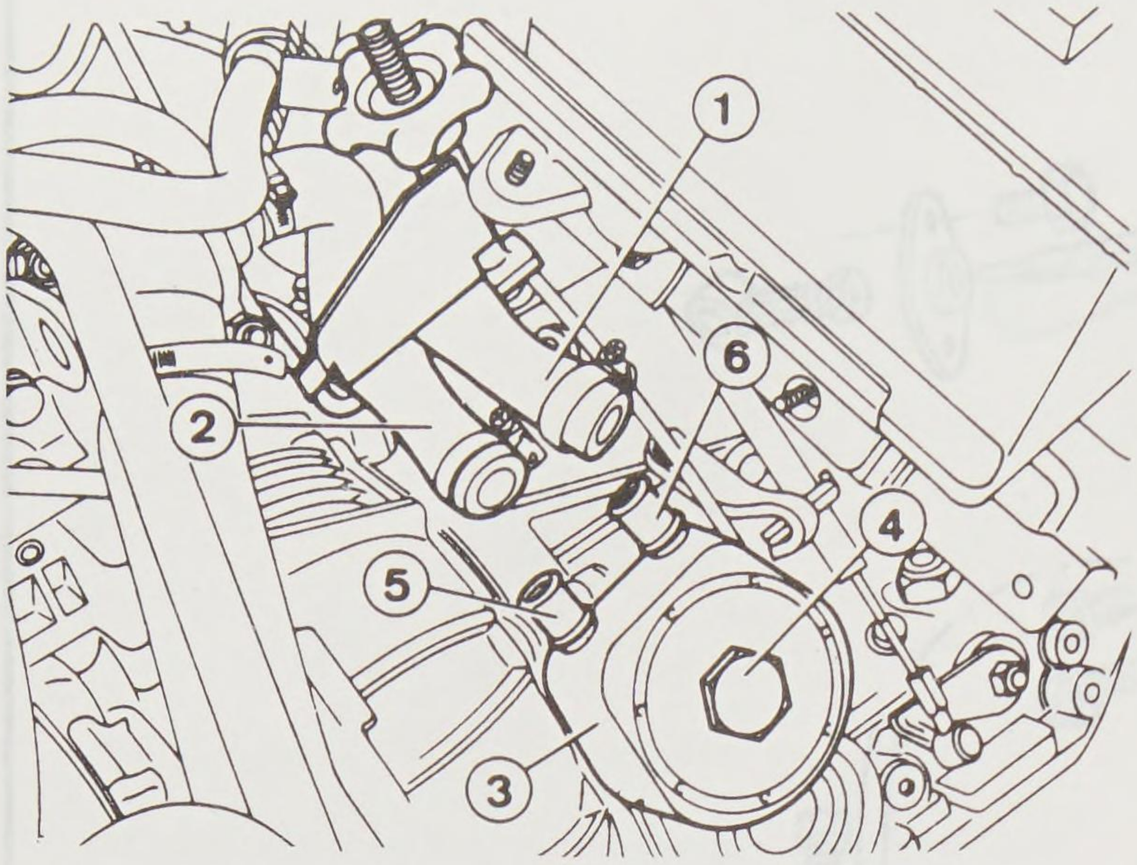


Fig 6.31 Coolant/ATF heat exchanger (Sec 27)

1 and 2 Coolant hoses
3 Heat exchanger
4 Securing bolt
5 and 6 Coolant hose connections

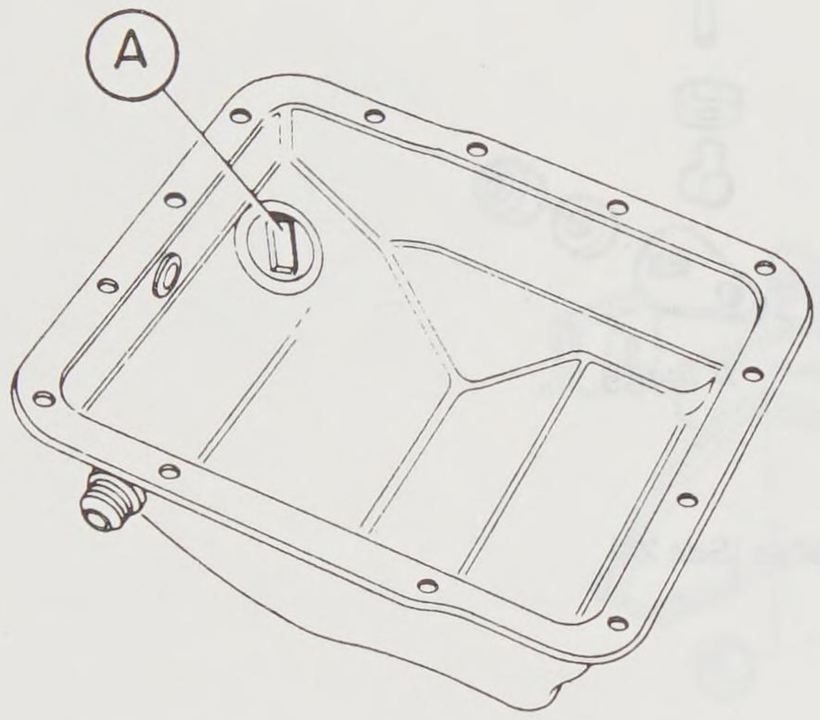


Fig 6.33 Magnet (A) inside sump (Sec 28)

28 Sump – removal and refitting

Caution: *The sump must only be removed in clean, dry conditions. To attempt removal in a driveway or at the roadside is to invite the entry of grit, which will wreak havoc with the internals of the transmission unit.*

1 Drain the fluid from the transmission unit as described in Section 18. It is not necessary to drain the final drive unit.
2 Unscrew the dipstick tube nut.
3 Unbolt and remove the sump.
4 Inspect the magnet in the sump (Fig. 6.33), noting the size and nature of any particles adhering to it, which would indicate failure of internal components in the transmission unit.
5 Clean the sump and magnet, then refit in reverse order to removal, using a new gasket and tightening all bolts to the specified torque.
6 Fill the transmission unit with ATF as described in Section 17.

29 Filter gauze – renewal

Note: *There is no requirement for routine renewal or cleaning of the filter gauze. This will only be necessary after fluid contamination.*

1 Remove the sump as described in Section 28.
2 Unbolt and remove the casing and the filter gauze.

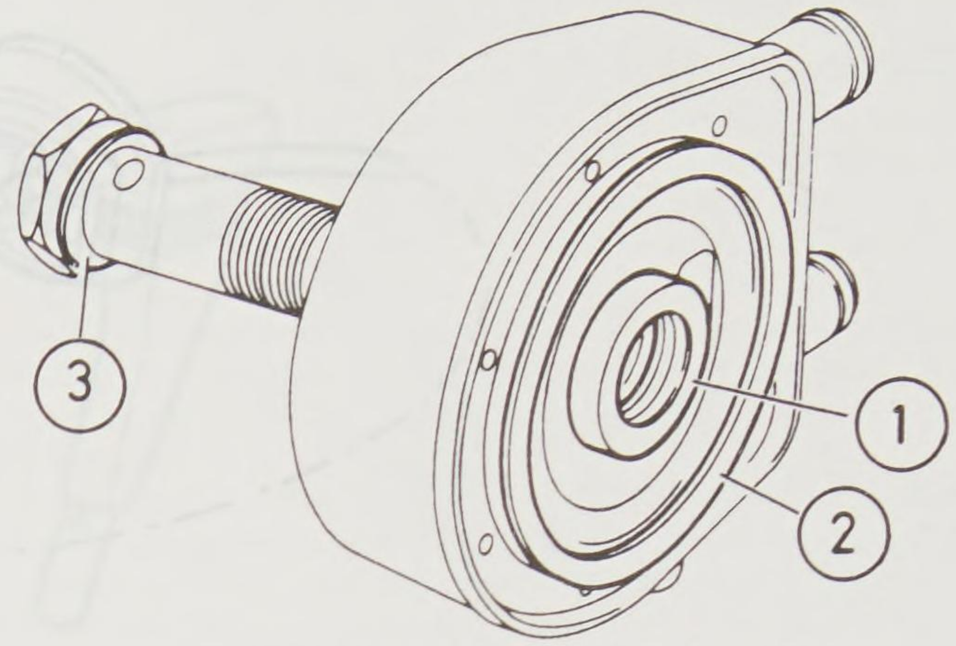


Fig 6.32 Heat exchanger seals (Sec 27)

1 Inner seal
2 Outer seal
3 Bolt seal

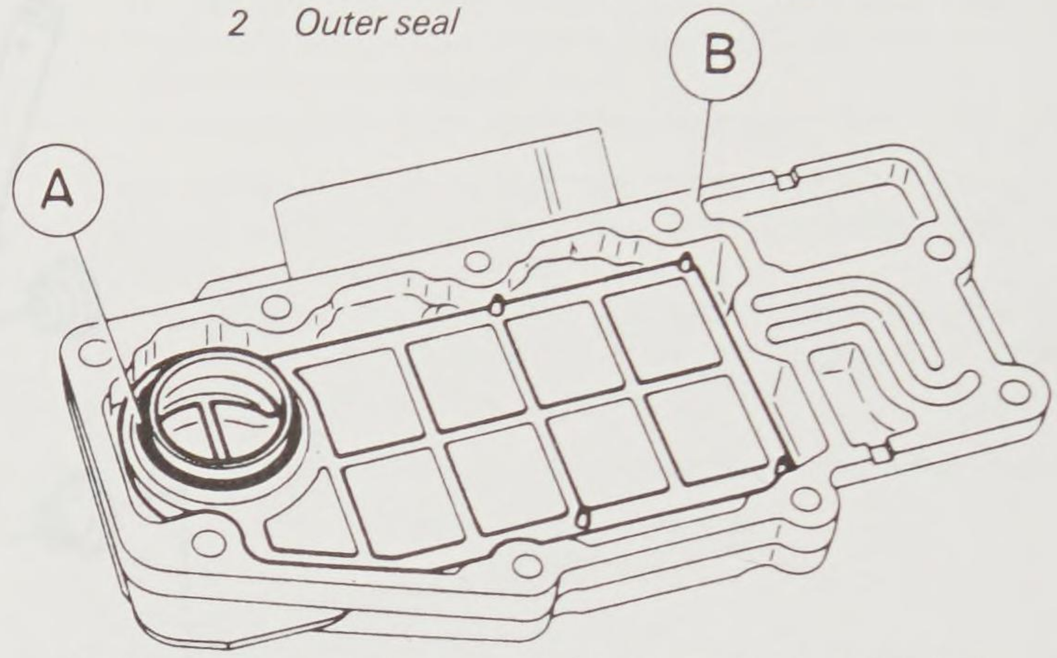


Fig 6.34 Filter gauze O-ring seal (A) in hydraulic block (B) (Sec 29)

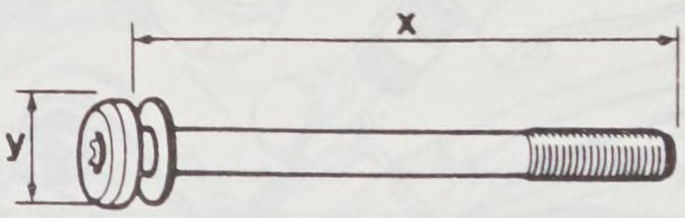


Fig 6.35 Location and tightening sequence of the hydraulic block casing securing bolts (Sec 29)

Bolt number	X	Y	Tightening torque Nm	Tightening torque lbf ft
1	*80*	*12*	*8*	*6*
2	*80*	*10*	*6*	*4*
3	*70*	*12*	*8*	*6*
4	*65*	*10*	*6*	*4*
5	*60*	*10*	*6*	*4*

X and Y measured in mm

3 Lift out the filter gauze and clean it in clean ATF, or if it is heavily contaminated or damaged, renew it.
4 Clean the mating faces of the casing and the hydraulic block, then coat a new gasket with clean ATF and stick it in position on the hydraulic block.

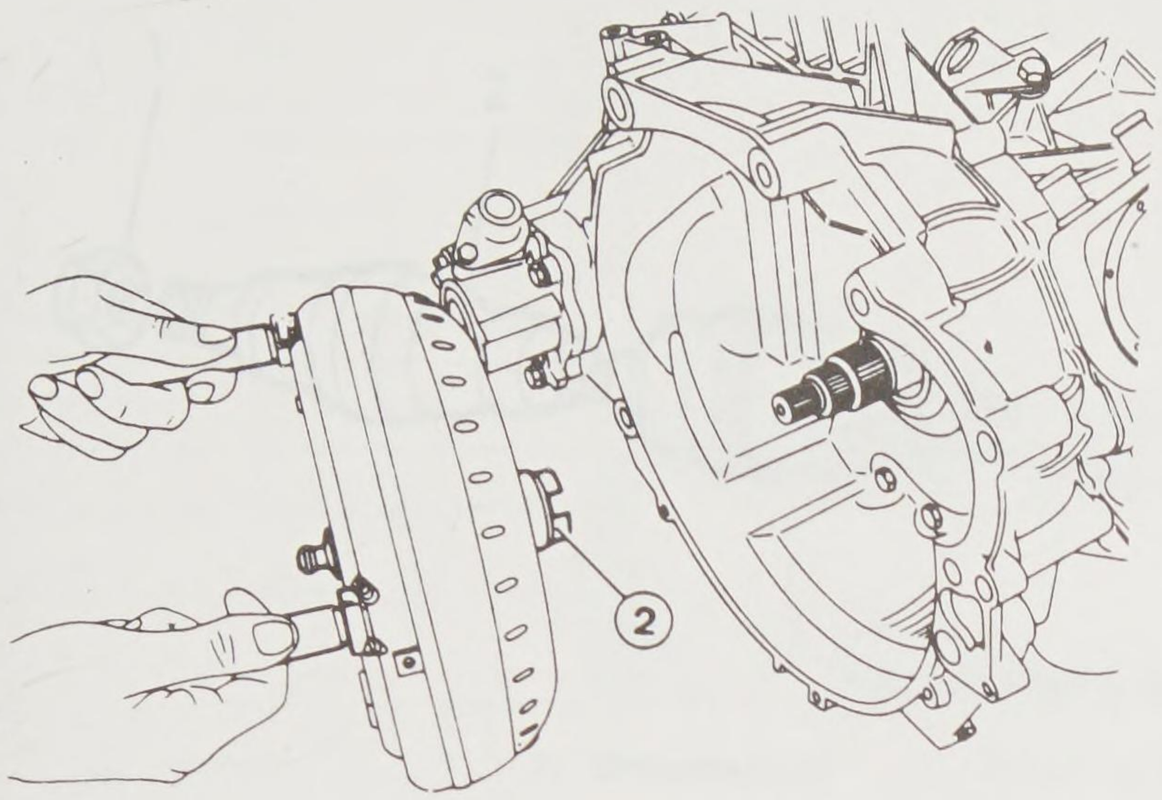


Fig 6.36 Using two long M8 bolts to remove the torque converter (Sec 30)

2 Fluid pump drive dogs

5 Fit a new O-ring to the filter gauze then fit the filter to the casing.
6 Refit the casing to the hydraulic block, fit and tighten the securing bolts in accordance with Fig. 6.35.
7 Refit the sump as described in Section 28.

30 Torque converter oil seal – renewal

1 Remove the transmission unit as described in Section 19.
2 If fitted, remove the bracket used to keep the converter in the transmission housing during removal.
Caution: *The torque converter will still contain approximately 3.5 litres (6 pints) of ATF.*
3 Using two long M8 bolts screwed into the converter as handles lift the converter off the input shaft and out of the transmission housing (Fig. 6.36).
4 Apply a little ATF to the sides of the oil seal bore, then using a stiff wire hook, extract the oil seal (Fig. 6.37).
5 Lubricate a new oil seal with ATF, position it over the input shaft and into the bore, then push it fully home using a suitable length of tubing (Fig. 6.38).
6 Refit the converter, being careful not to damage the seal, and rotating the converter to engage the ATF pump dogs.
7 Refit the transmission unit as described in Section 19.

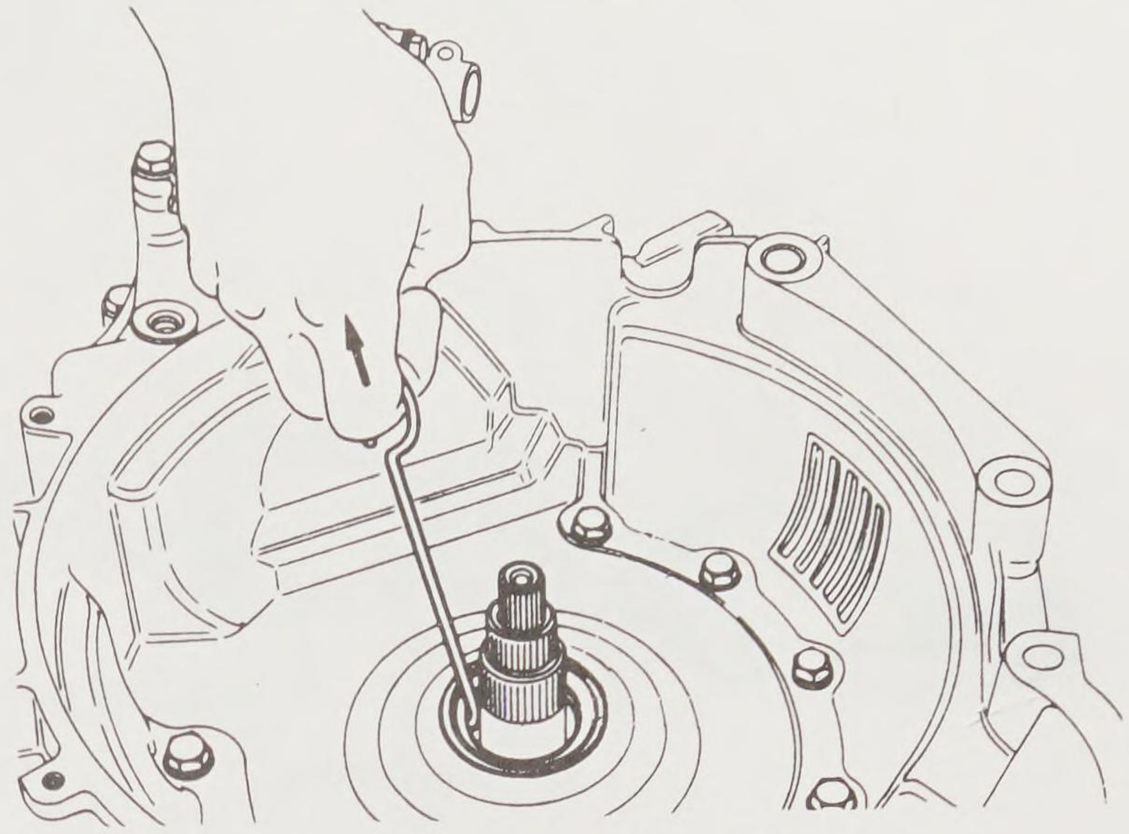


Fig 6.37 Extracting the oil seal (Sec 30)

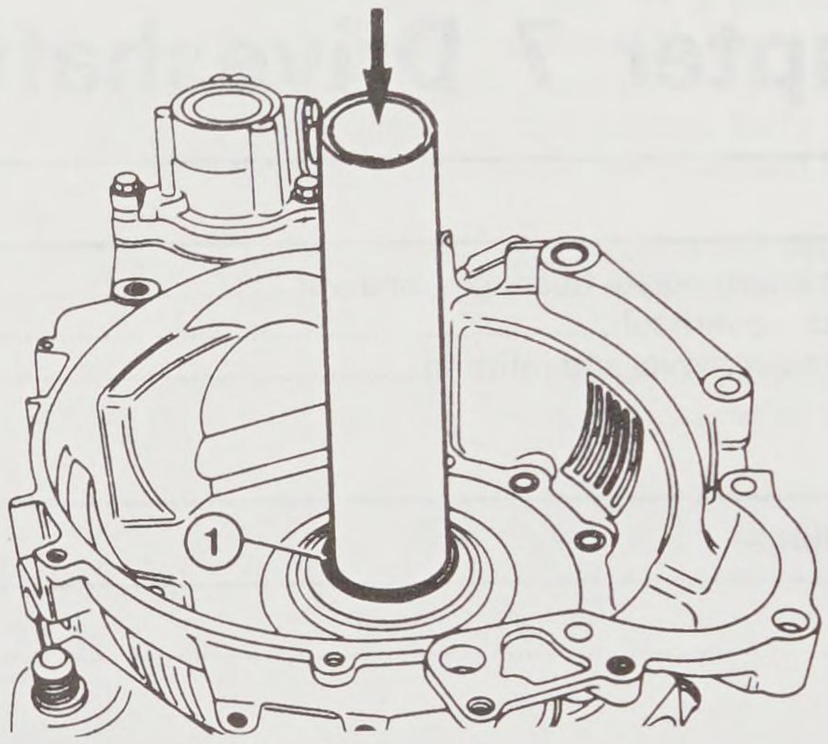


Fig 6.38 Refitting the seal (1) using a length of tube (Sec 30)

31 Fault diagnosis – automatic transmission

1 Faults not due to incorrect fluid level or adjustment of the selector, accelerator and kickdown cables must be diagnosed by a Peugeot dealer or automatic transmission specialist.
2 Do not remove the transmission for specialist repair without allowing the specialist to test it *in situ.* Some faults cannot be diagnosed with the transmission removed.

Chapter 7 Driveshafts

Contents

Driveshaft intermediate bearing – renewal 5
Driveshafts – overhaul 4
Driveshafts – removal and refitting 3
Fault diagnosis – driveshafts 6
General description 1
Maintenance and inspection 2

Specifications

Type	Open, solid, with constant velocity joint at each end. Intermediate bearing on right-hand side only
Lubricant type	Special lubricant supplied with repair kit

Torque wrench settings

	Nm	lbf ft
Driveshaft nut	75	55
Front suspension lower balljoint nut	30	22
Intermediate bearing nuts	17	12
Intermediate bearing housing bolts	25	18
Roadwheel bolts	85	63

1 General description

Drive to the front wheels is transmitted from the final drive unit to the front hubs by two driveshafts. The driveshafts incorporate inner and outer joints to accommodate suspension and steering angular movement.

The inner ends of the driveshafts are splined to the final drive/differential side gears, and the outer ends are splined to the front hubs.

2 Maintenance and inspection

Carry out the following procedures at the intervals given in 'Routine maintenance' *at the beginning of the manual.*

1 Jack up the front of the car and support on axle stands. Apply the handbrake.

2 Thoroughly examine the rubber bellows at each end of the driveshafts for splitting, damage and grease leakage. If evident, have the bellows renewed.

3 Check the right-hand driveshaft intermediate housing for excessive wear by attempting to move the driveshaft up and down. Also turn the right-hand wheel and listen for excessive noise which would indicate pitted tracks or balls. Renew the bearing if necessary.

4 If the driveshaft joints are excessively noisy, perhaps more noticeable when turning corners, renew the driveshaft.

3 Driveshafts – removal and refitting

1 Remove the anti-roll bar link rod-to-lower suspension arm bolt.

2 Raise the vehicle onto axle stands and remove the road wheels.

3 Remove the under-engine splash panels.

4 Drain the gearbox oil or automatic transmission fluid as described in Chapter 6, Sections 2 or 18 as applicable.

5 Where fitted, unbolt the ABS sensor and tie it back out of the way.

6 Remove the locking pin and serrated cap from the driveshaft nut (photo).

7 Remove the driveshaft nut. Do not attempt to prevent the hub from turning by using the brakes, as the disc retaining screws will probably shear. Use two roadwheel bolts and a long bar (photo).

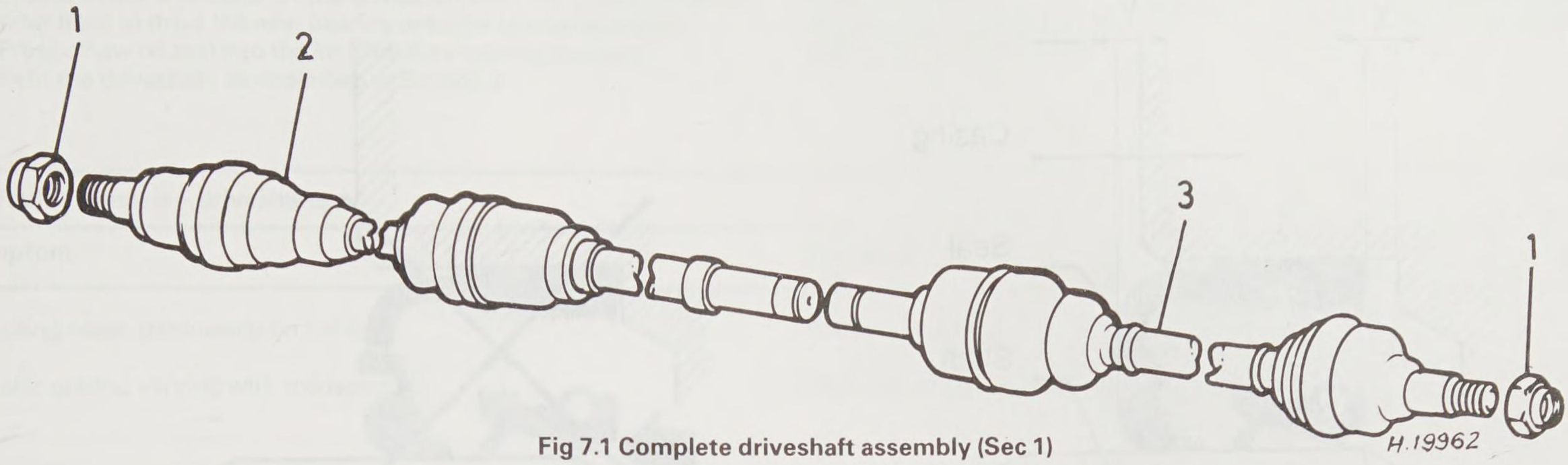


Fig 7.1 Complete driveshaft assembly (Sec 1)

1 Driveshaft nut 2 Right-hand driveshaft 3 Left-hand driveshaft

8 Refer to Chapter 9, Section 5 and separate the lower suspension arm from the hub carrier.

Right-hand shaft

9 Loosen the two nuts on the intermediate bearing and give the two bolts half a turn to disengage their offset heads from the bearing housing.

10 Turn the steering wheel fully to the left.

11 Pull the hub carrier outward to disengage the driveshaft from the hub.

12 Pull the driveshaft outward to disengage it from the differential and withdraw the shaft, feeding it through the intermediate bearing housing.

Left-hand shaft

13 Proceed as for the right-hand shaft, turning the steering wheel fully to the right, and ignoring references to the intermediate bearing.

Caution: *The vehicle must not be moved with the driveshafts removed or damage to the wheel bearings will result.*

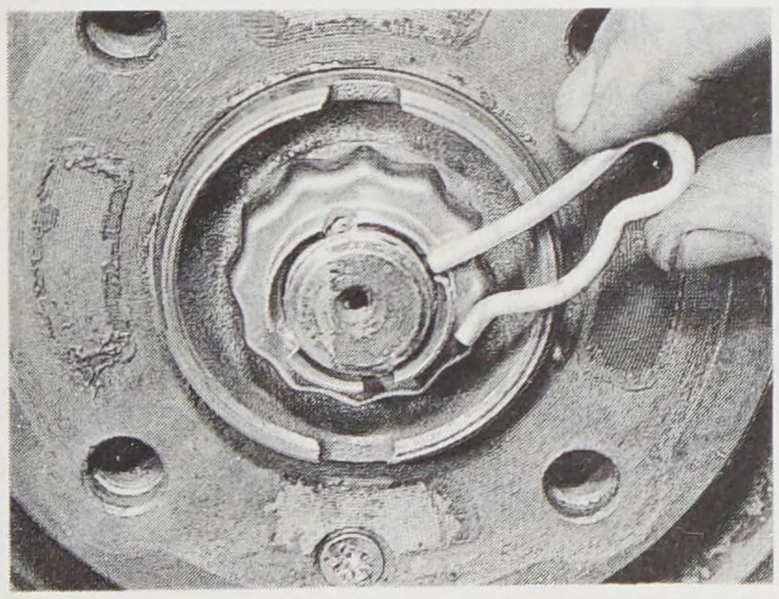
Refitting

14 Two types of driveshaft differential oil seal may be encountered. Early types are plain and the right-hand seal has a plastic guard to protect the seal during fitting of the driveshaft. The guard is removed after the driveshaft is fitted. Later seals have an integral segmented guard which remains in position during use (photo). Early type seals must be renewed each time the driveshaft is removed, but later types can be re-used.

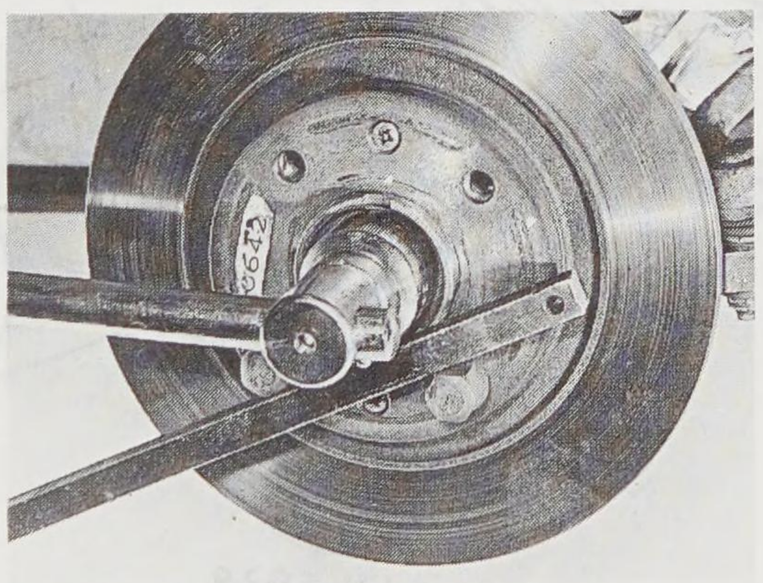
15 To renew the seals (early and late types), prise the seal from the differential housing, being careful not to score the seal contact area (photo).

16 Fill the space between the seal lips with grease and also smear grease around the seal outer edge. Fit the plastic guard to early right-hand seals.

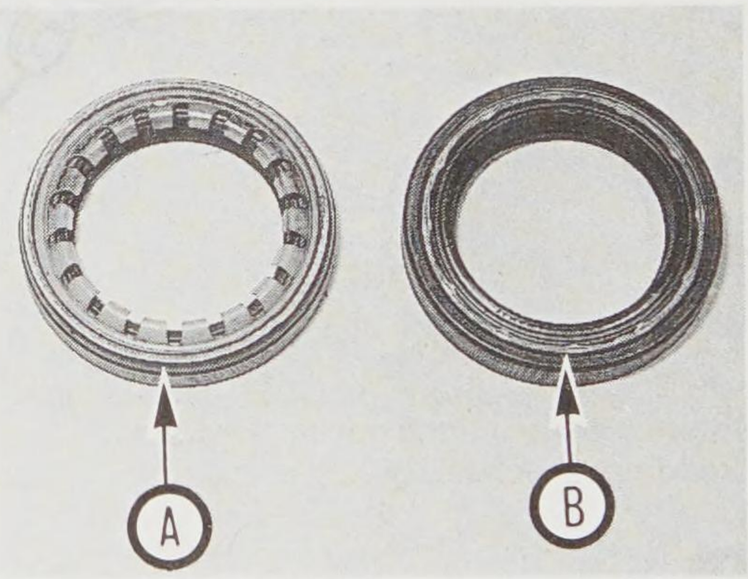
17 Special mandrels are available from Peugeot dealers for fitting the seals to the correct depth, but if these are not obtainable use a socket of suitable diameter and tap the seal into the differential housing (photo) so that the protrusion shown in Fig. 7.2 is obtained. Do not tap the seal fully



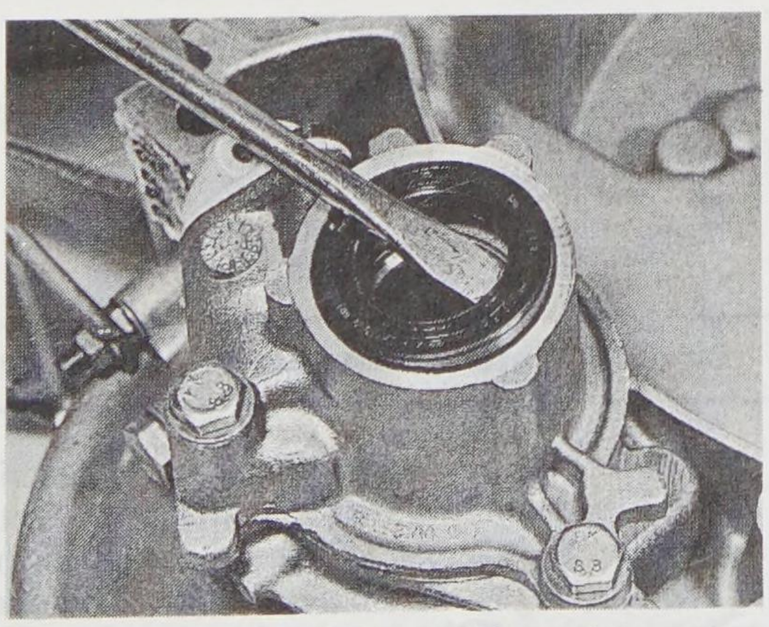
3.6 Remove the locking pin and serrated cap from the driveshaft nut



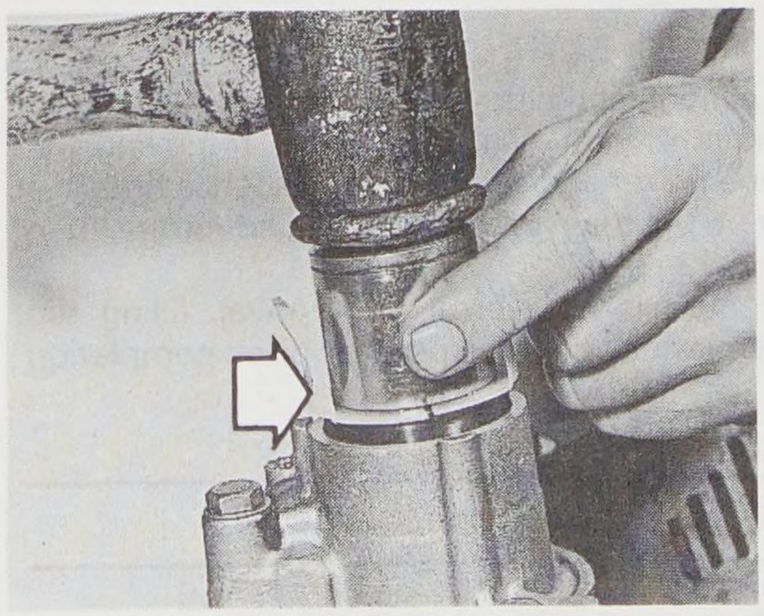
3.7 Removing the driveshaft nut



3.14 Later type seal 'A' and early type 'B'



3.15 Prising a driveshaft seal from the differential housing



3.17 Fitting an older type seal using a socket. Seal protector arrowed

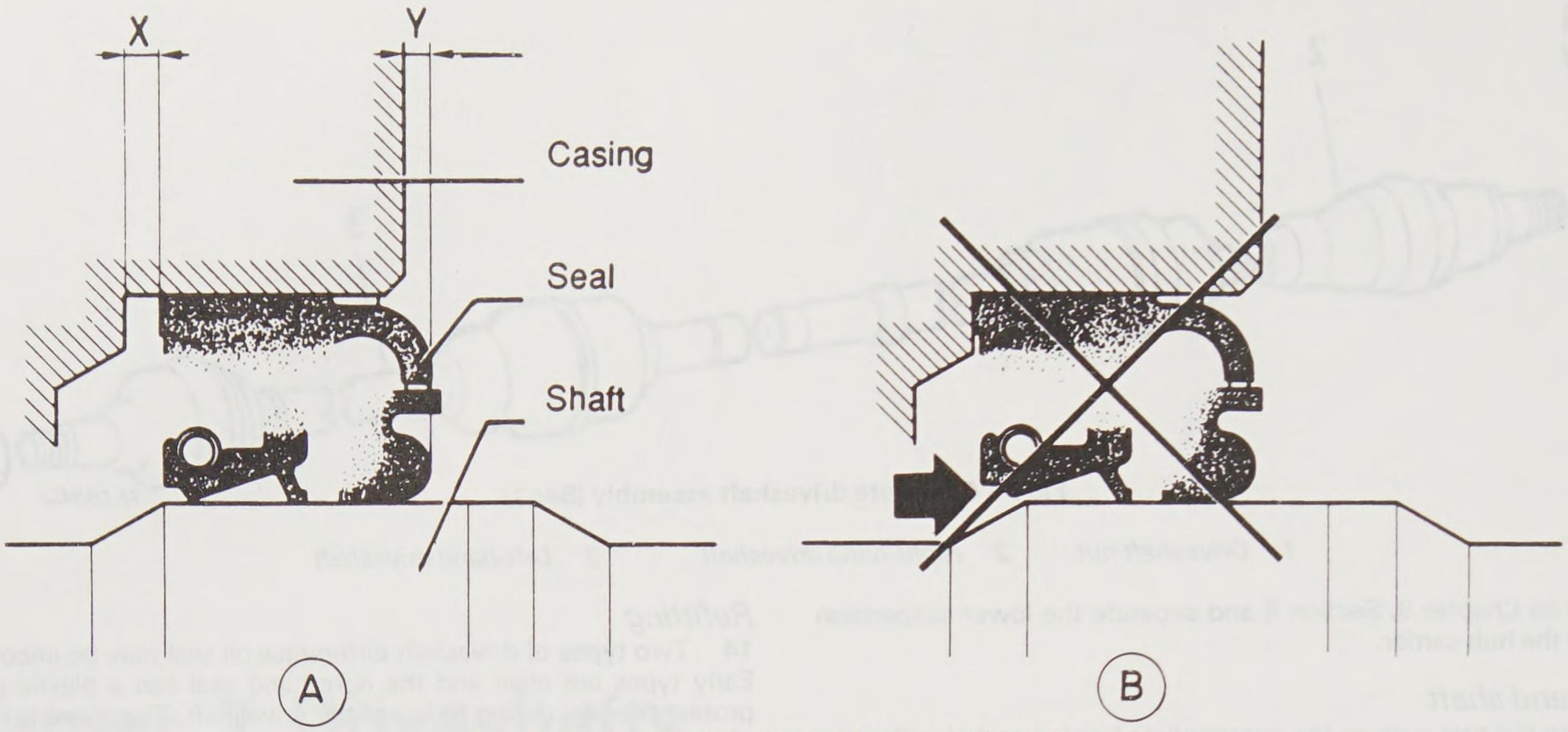


Fig 7.2 Correct fitting of driveshaft seals (Sec 3)

A Correct fitting *B Incorrect fitting* *Y = 1.5 mm (right-hand side)*
1.0 mm (left-hand side)

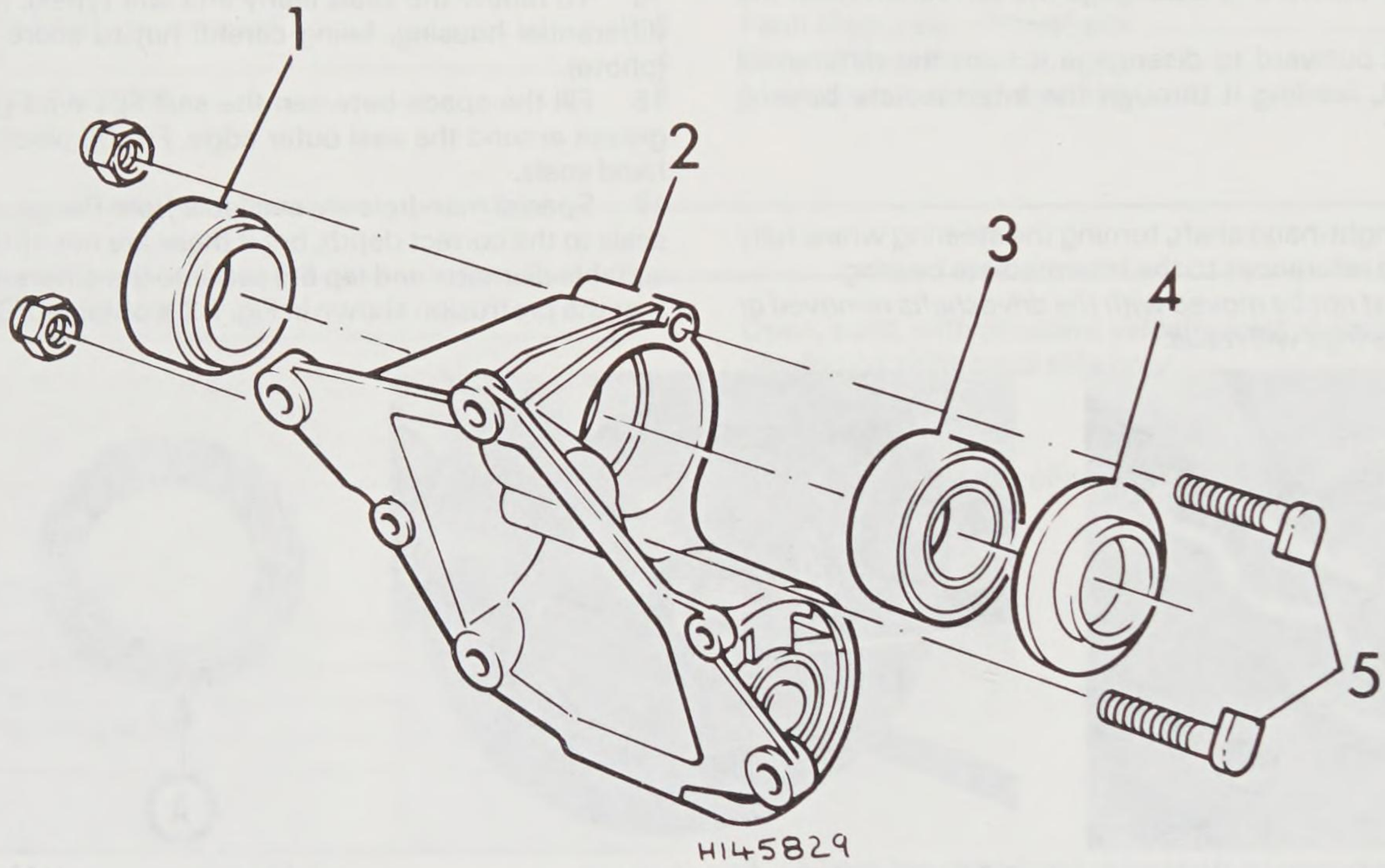


Fig 7.3 Exploded view of driveshaft intermediate bearing (Sec 5)

1 Oil seal *2 Bearing housing/engine mounting* *3 Bearing* *4 End cover* *5 Bolts*

home or the seal lip may not contact the driveshaft and leaks will result.
18 Refitting the driveshafts is a reversal of removal, removing the plastic guard from early type right-hand seals after the shaft is fitted.
19 Fit a new driveshaft nut, tightening it to the specified torque, then fit the serrated collar and locking pin.
20 The remaining procedure is a reversal of removal, filling the gearbox or automatic transmission with the specified oil on completion (see Chapter 6).

4 Driveshafts – overhaul

1 It is regretted that at the time of writing insufficient information on driveshaft overhaul was available.
2 If the driveshafts/bearings are defective, fit an exchange shaft obtainable from Peugeot dealers.
3 If the driveshaft bellows are split or perished, have a Peugeot dealer renew them.

5 Driveshaft intermediate bearing – renewal

1 Remove the right-hand driveshaft, as described in Section 3.
2 Place the bearing and driveshaft in a vice with the inner track resting on the vice, then use a soft-faced mallet to drive out the driveshaft. Remove the end cover and oil seal from the driveshaft and intermediate bearing housing. If the bearing has remained in the housing when the driveshaft was removed use a metal tube on the inner track to drift it out.
3 Clean the bearing recess in the housing.

4 Locate a new end cover on the driveshaft then use a metal tube on the inner track to drive the new bearing onto the special shoulder.
5 Press a new oil seal into the intermediate bearing housing.
6 Refit the driveshaft, as described in Section 3.

Note: *If the bearing housing is removed from the engine, on refitting, the housing bolts must be coated with thread locking compound and tightened to the specified torque.*

6 Fault diagnosis – driveshafts

Symptom	Reason(s)
Knocking noise, particularly on full lock	Worn driveshaft joints
Metallic grating varying with roadspeed	Worn intermediate bearing on right-hand driveshaft

Chapter 8 Braking system

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Specifications

Type	
Carburettor models	Discs front, drums rear, servo-assisted, split circuit, with pressure-regulating valve on rear brakes
Fuel injection models	As for carburettor models, but with ventilated front discs and solid rear discs
Mi 16 models	Bendix anti-lock brake system (ABS optional on other fuel injection models)
Brake fluid type/specification	Hydraulic fluid to SAE J1703 or DOT 4 (Duckhams Universal Brake and Clutch Fluid)
Front brakes	
Disc diameter	266.0 mm (10.48 in)
Disc thickness	
New:	
Solid discs	10.0 mm (0.39 in)
Ventilated discs	20.4 mm (0.80 in)
Minimum:	
Solid discs	9.0 mm (0.35 in)
Ventilated discs	18.0 mm (0.70 in)
Disc run-out (maximum)	0.07 mm (0.002 in)
Minimum brake pad lining thickness (approximately)	2.0 mm (0.80 in)
Rear drum brakes	
Drum internal diameter (new)	228.6 mm (9.0 in)
Maximum after resurface	229.6 mm (9.05 in)
Maximum out of round	0.07 mm (0.002 in)
Minimum shoe lining thickness	1.0 mm (0.04 in)
Rear disc brakes	
Disc diameter	249.0 mm (9.8 in)
Disc thickness:	
New	10.0 mm (0.40 in)
Minimum	9.0 mm (0.35 in)
Maximum disc runout	0.07 mm (0.002 in)

Vacuum servo unit

Servo diameter:	
Carburettor models	203.2 mm (8.0 in)
Fuel injection models	228.6 mm (9.0 in)

Anti-lock braking system (ABS)

System pressure	160 to 180 bar (2320 to 2610 lbf/in^2)

Torque wrench settings

	Nm	lbf ft
Calliper guide bolts	35	26
Calliper carrier bolts	120	88
ABS wheel sensor retaining bolt	10	7
ABS front wheel sensor adjusting bolt	3	2

1 General description

All models have diagonally split dual circuit, servo assisted brake systems.

Carburettor versions have front disc brakes and rear drums, while fuel injected models have disc brakes all round, ventilated at the front. Mi16 models have a Bendix anti-lock braking system (ABS) as standard, which is also available as an optional extra on certain models.

All models (except those fitted with ABS) have a load sensitive brake pressure regulator valve fitted in the rear brake circuit which, working in conjunction with the rear suspension, prevents the rear wheels locking under harsh braking conditions.

The handbrake is cable operated acting on the rear brakes.

2 Routine maintenance

1 At the intervals given in Routine maintenance at the beginning of this manual, carry out the following operations.

2 On cars not equipped with ABS, check the brake fluid level in the master cylinder reservoir and top up as necessary. The level must be maintained above the minimum mark on the side of the reservoir. To top up, remove the filler cap and carefully fill the reservoir using the specified hydraulic fluid. Mop up any spillage immediately and refit the cap. At the same time, check the operation of the low fluid level warning lamp by depressing the test button on the top of the reservoir and having an assistant check that the lamp lights (photos).

3 On cars equipped with ABS, check the brake fluid level using the procedure described in Section 27.

4 Inspect all brake hoses, pipelines and unions as described in Section 5.

5 Inspect all system components for leakage. The need for frequent topping up would indicate a leak which should be investigated immediately.

6 Inspect the front disc brake pads for wear as described in Section 6 and the rear disc brake pads or drum brake shoes as described in Sections 7 or 8 respectively.

7 Check the operation and adjustment of the handbrake as described in Section 19.

8 Renew the hydraulic fluid in the complete system as described in Section 3.

3 Brake fluid – renewal

Note: *The following procedure is only applicable to vehicles without ABS. For ABS equipped models, refer to the warning note in Section 26.*

1 Remove the reservoir cap and siphon out as much of the old fluid as possible.

2 Fill the reservoir with the specified brake fluid.

3 Bleed the brake system as described in Section 4 until the quantity of fluid bled from each brake is sufficient to ensure that all the old fluid has been ejected.

4 Hydraulic system – bleeding

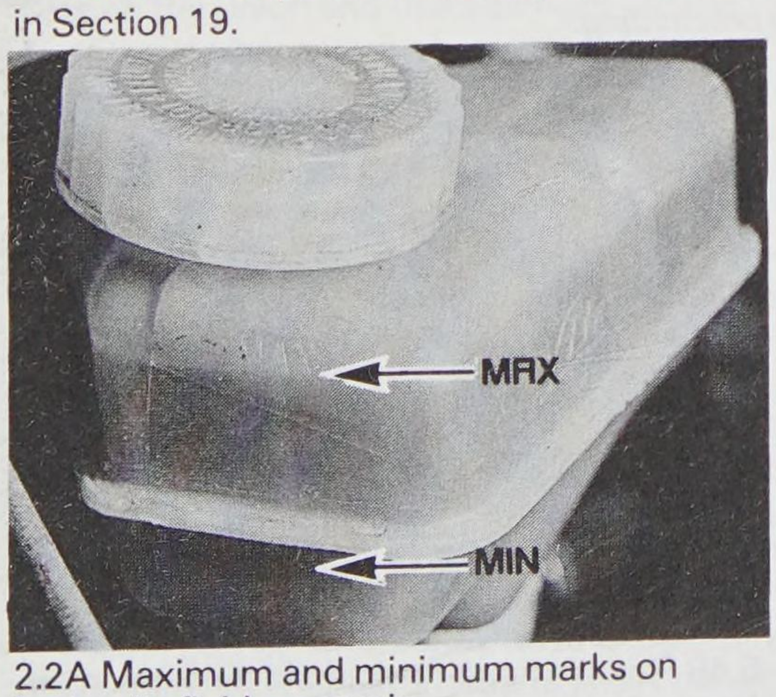
Note: *The following procedure is only applicable to vehicles without ABS. For ABS equipped models refer to the warning note in Section 26.*

1 If the hydraulic system is to be drained follow the procedure given in Section 3. If the master cylinder or connecting pipes have been removed, the complete hydraulic system must be bled, but if only a calliper or wheel cylinder has been removed then only that particular circuit need be bled. However, refer to Section 12 for rear disc brake callipers.

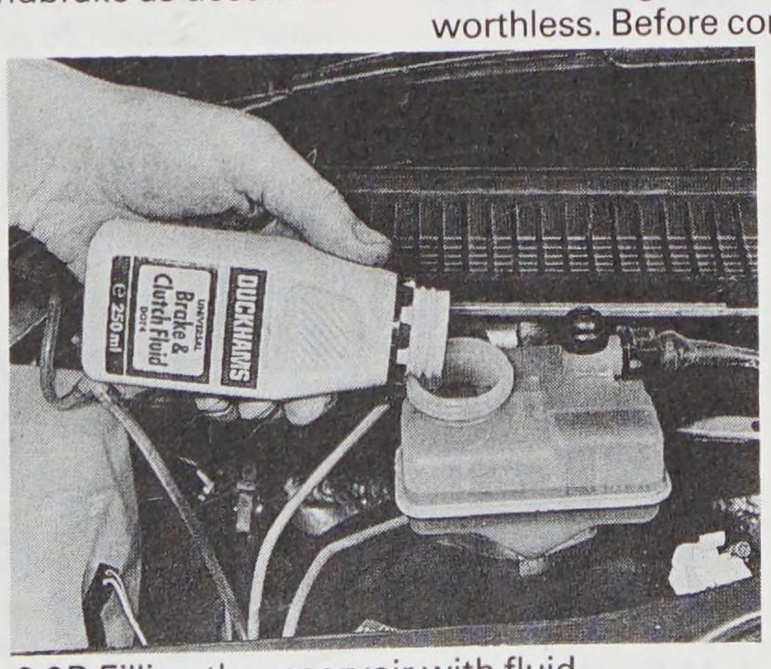
2 If the complete system is being bled, the sequence of bleeding should be as follows:

RH rear wheel
LH front wheel
LH rear wheel
RH front wheel

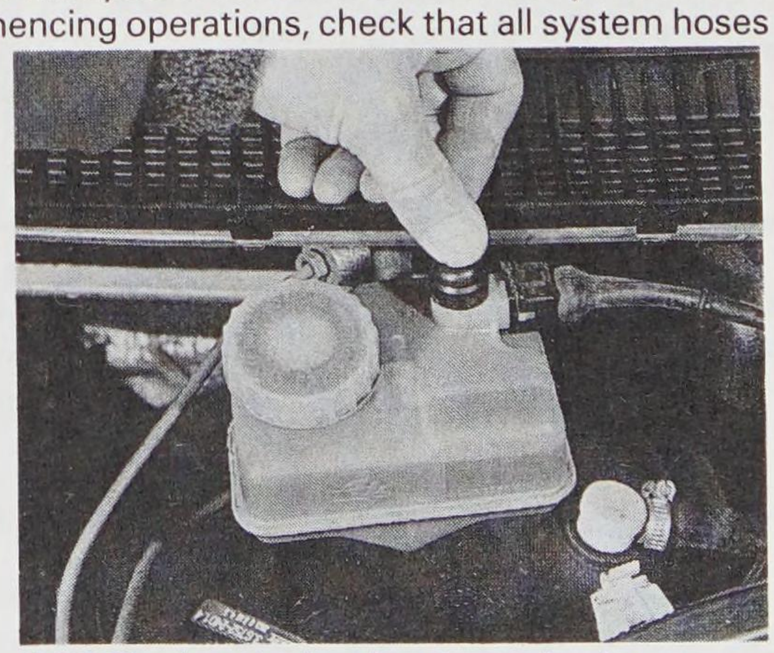
3 Unless the pressure bleeding method is being used, do not forget to keep the fluid level in the master cylinder reservoir topped up to prevent air from being drawn into the system which would make any work done worthless. Before commencing operations, check that all system hoses

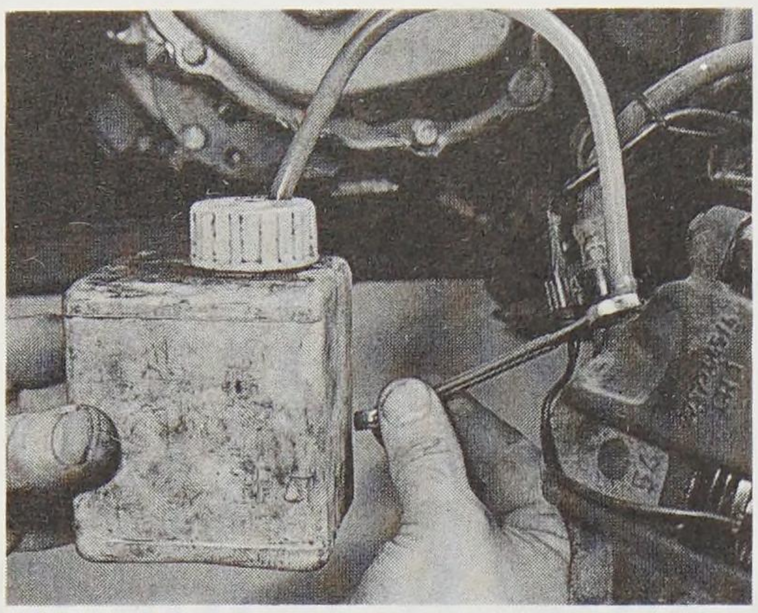


2.2A Maximum and minimum marks on hydraulic fluid reservoir

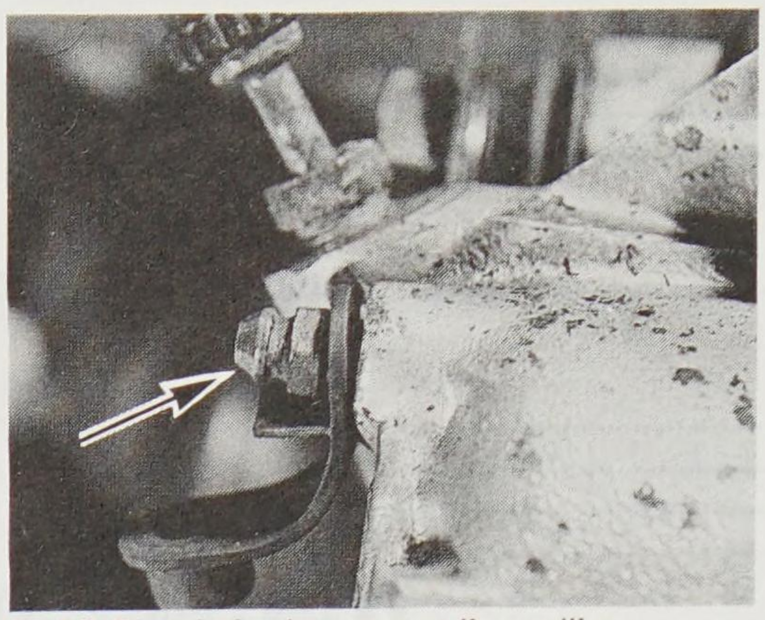


2.2B Filling the reservoir with fluid

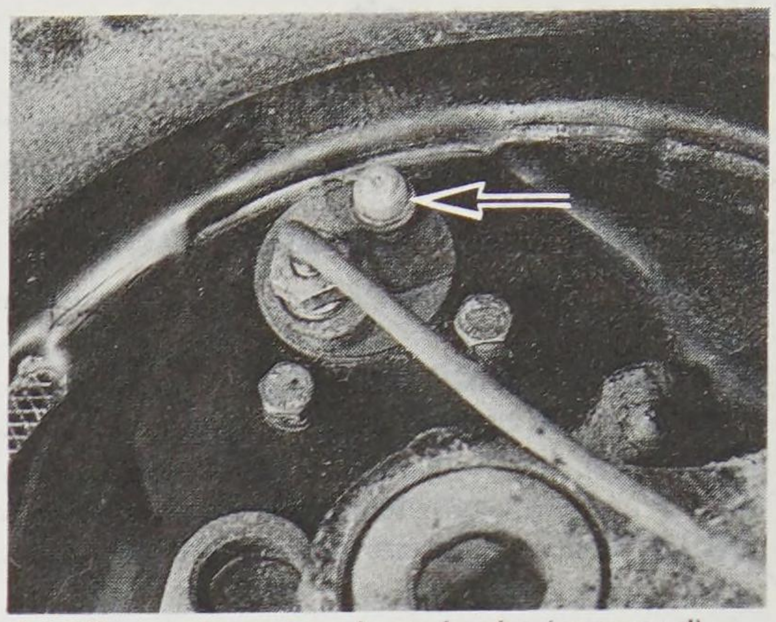

2.2C Testing the low level warning lamp



4.12A Using a one-man brake bleeding kit on a front calliper



4.12B Bleed nipple on rear disc calliper (arrowed) ...



4.12C ... and on rear drum brake (arrowed)

and pipes are in good condition with unions tight and free from leaks.

4 Take great care not to allow hydraulic fluid to come into contact with the vehicle paintwork as it is an effective paint stripper. Wash off any spilled fluid immediately with cold water.

5 On models with a vacuum servo destroy the vacuum by giving several applications of the brake pedal in quick succession.

Bleeding – two man method

6 Gather together a clean jar and a length of rubber or plastic tubing which will be a tight fit on the brake bleed screws.

7 Engage the help of an assistant.

8 Push one end of the bleed tube onto the first bleed screw and immerse the other end in the jar which should contain enough hydraulic fluid to cover the end of the tube.

9 Open the bleed screw a half a turn and have the assistant depress the brake pedal fully and hold it depressed while the bleed screw is tightened. Release the brake pedal. This method prevents air being drawn back into the system.

10 Repeat this operation until clean hydraulic fluid, free from air bubbles, can be seen coming through into the jar.

11 With the bleed screw tightened, remove the bleed tube and proceed to the next wheel.

Bleeding – using one-way valve kits

12 There are a number of one-man, one-way brake bleeding kits available from motor accessory shops. It is recommended that one of these kits is used wherever possible as it will greatly simplify the bleeding operation and also reduce the risk of air or fluid being drawn back into the system, quite apart frcm being able to do the work without the help of an assistant. To use the kit, connect the tube to the bleed screw and open the screw one half a turn (photos).

13 Depress the brake pedal fully then slowly release it. The one-way valve in the kit will prevent expelled air from returning at the end of each pedal downstroke. Repeat the operation several times to be sure of ejecting all the air from the system. Some kits include a translucent container which can be positioned so that air bubbles can actually be seen being ejected from the system.

14 Tighten the bleed screw, remove the tube and repeat the operations on the remaining brakes.

15 On completion, depress the brake pedal. If it still feels spongy, repeat the bleeding operations as air must still be trapped in the system.

Bleeding – using a pressure bleeding kit

16 These kits are available from motor accessory shops and are usually operated by air pressure from the spare tyre.

17 By connecting a pressurised container to the master cylinder fluid reservoir, bleeding is then carried out simply by opening each bleed screw in sequence and allowing the fluid to run out, rather like turning on a tap, until no air is visible in the expelled fluid.

18 By using this method, the large reserve of hydraulic fluid provides a safeguard against air being drawn into the master cylinder during bleeding which may occur if the fluid level in the reservoir is allowed to fall too low.

19 Pressure bleeding is particularly useful when bleeding the complete system at time of routine fluid renewal.

All methods

20 When bleeding is completed, check and top up the fluid level in the master cylinder reservoir.

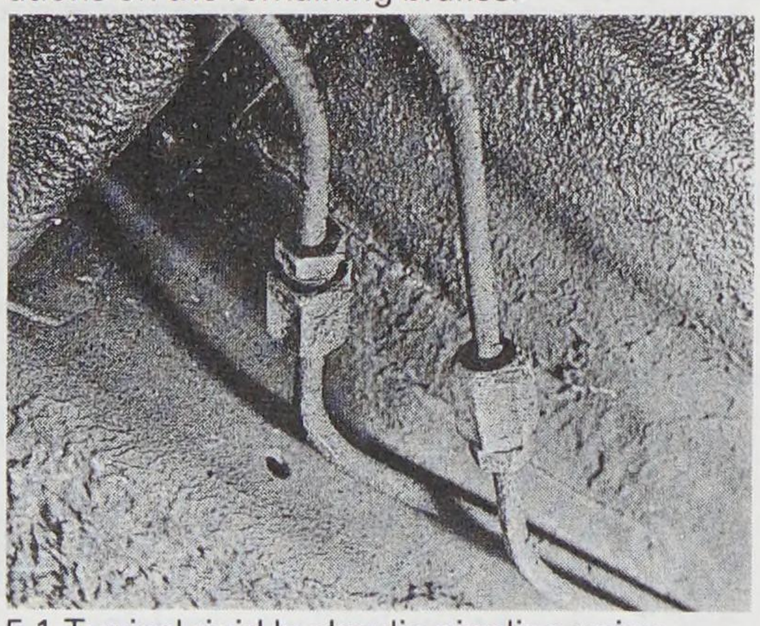
21 Check the feel of the brake pedal. If it feels at all spongy, air must still be present in the system and the need for further bleeding is indicated. Failure to bleed satisfactorily after a reasonable repetition of the bleeding operations may be due to worn master cylinder seals.

22 Always discard brake fluid which has been bled from the system. It is almost certain to be contaminated with moisture, air and dirt, making it unsuitable for further use.

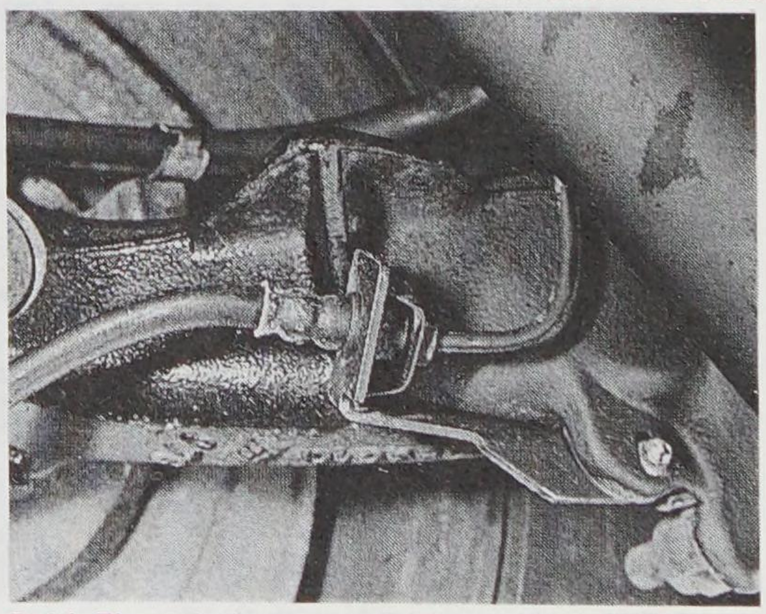
23 Clean fluid should always be stored in an airtight container as it absorbs moisture readily which lowers its boiling point and could affect braking performance under severe conditions.

5 Flexible hoses and hydraulic pipelines – inspection and renewal

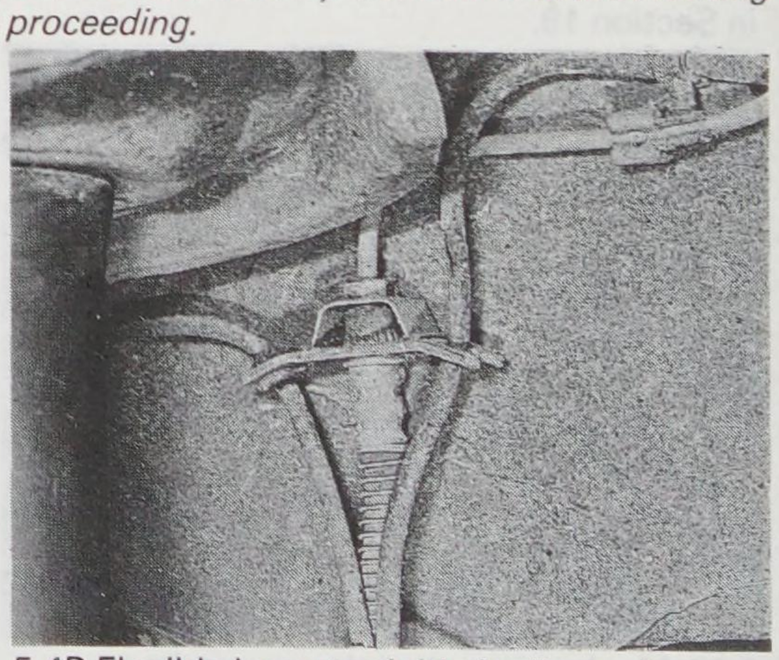
Note: *If inspection reveals an externally damaged pipe or hose on vehicles equipped with ABS, have the component renewed by a Peugeot dealer suitably equipped to service the ABS system. Refer to the warning note in Section 26 before proceeding.*



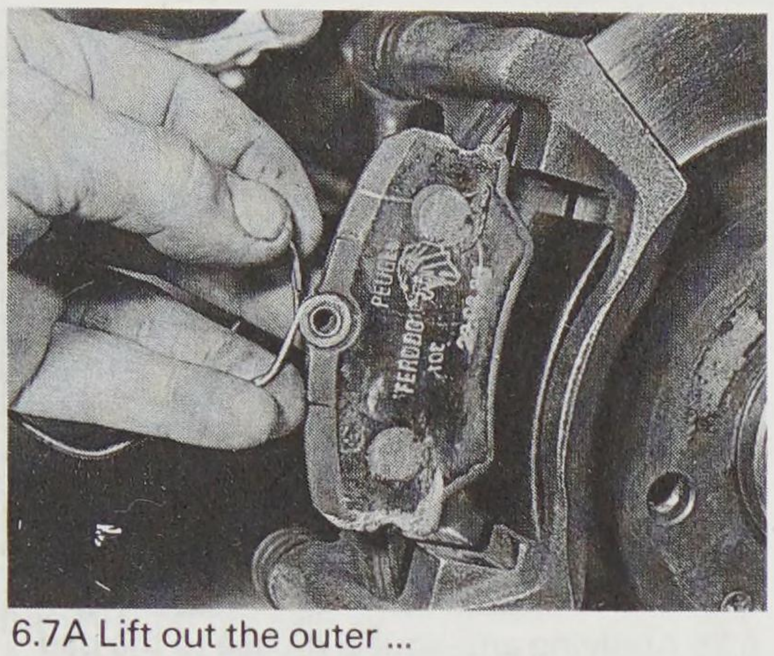
5.1 Typical rigid hydraulic pipeline union



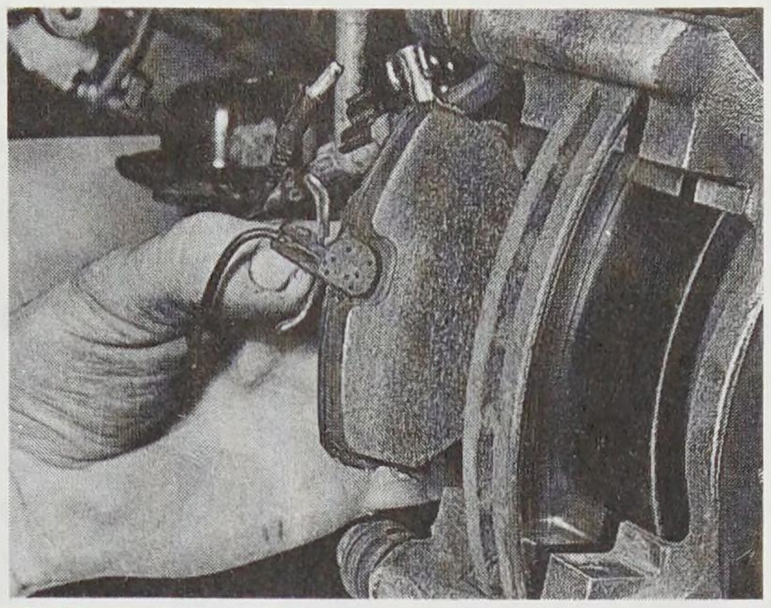
5.4A Flexible hose-to-rigid pipeline union on trailing arm



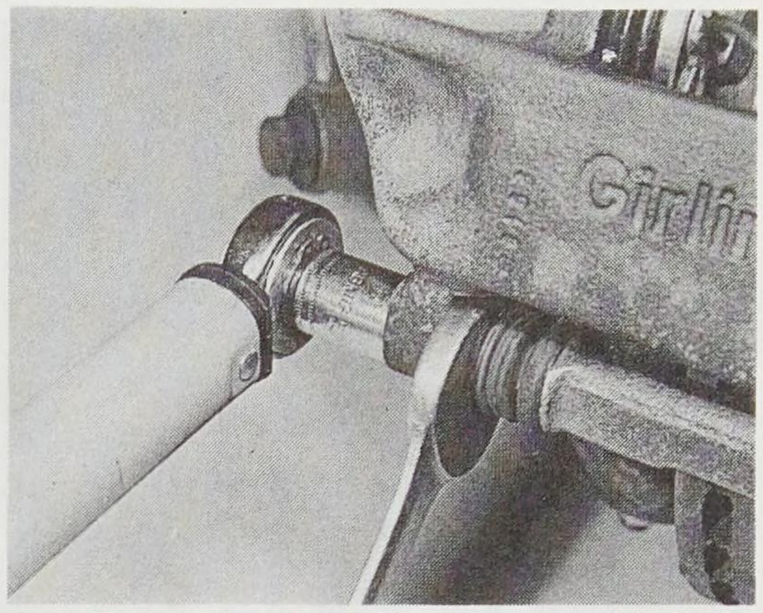
5.4B Flexible hose-to-rigid pipeline union on front wheel arch



6.7A Lift out the outer ...

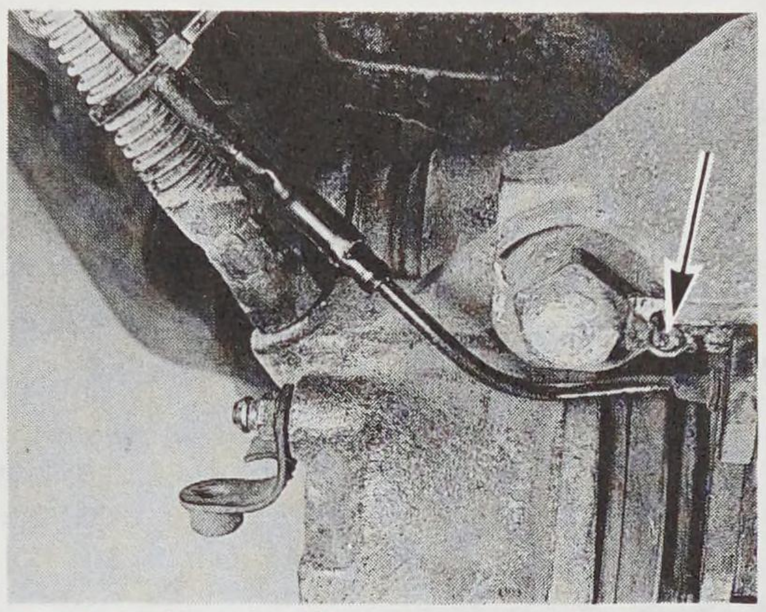


6.7B ... and inner pads

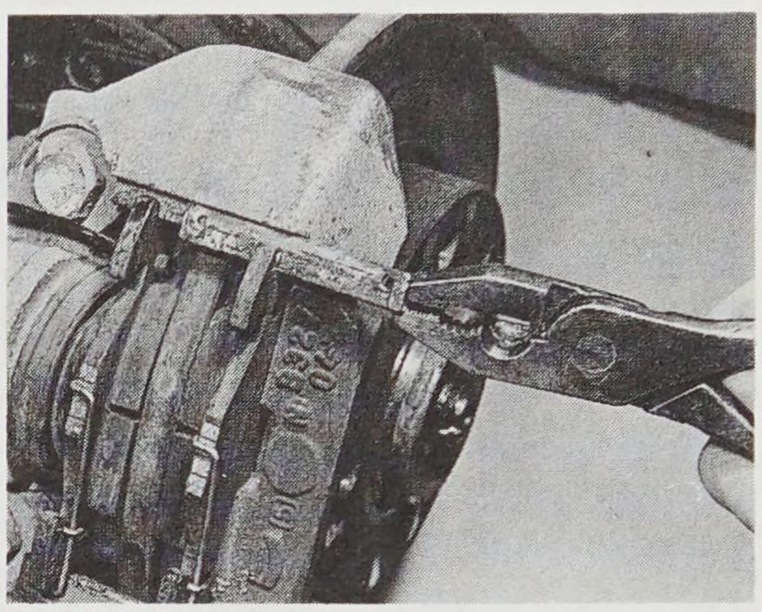


6.15 Tightening the calliper lower guide bolt

6.19 Disconnecting the wear indicator



6.20A Pad key locking cap arrowed on Bendix type front calliper



6.20B Pulling out the key

1 Examine all the unions for signs of leaks. Then look at the flexible hoses for signs of fraying and chafing (as well as for leaks). This is only a preliminary inspection of the flexible hoses as exterior condition does not necessarily indicate interior condition which will be considered later (photo).

2 The steel pipes must be examined equally carefully. They must be thoroughly cleaned and examined for signs of dents or other percussive damage, rust and corrosion. Rust and corrosion should be scraped off and if the depth of pitting in the pipes is significant, they will need renewal. This is most likely in those areas underneath the chassis and along the rear suspension arms where the pipes are exposed to the full force of road and weather conditions.

3 Rigid pipe removal is usually quite straightforward. The unions at each end are undone and the pipe drawn out of the connection. The clips which may hold it to the car body are bent back and it is then removed. Underneath the car exposed unions can be particularly stubborn, defying the efforts of an open-ended spanner. As few people will have the special split ring spanner required, a self-grip wrench is the only answer. If the pipe is being renewed, new unions will be provided. If not then one will have to put up with the possibility of burring over the flats on the union and use a self-grip wrench for replacement also.

4 Flexible hoses are always fitted to a rigid support bracket where they join a rigid pipe, the bracket being fixed to the chassis or rear suspension arm (photos). The rigid pipe unions must first be removed from the flexible union, then the retaining plate must be pulled out and the flexible hose and fitting released from the bracket.

5 Depending upon the make of the particular calliper, the flexible hose may be connected simply by screwing it into its tapped hole or by using a hollow bolt with banjo end fitting. Use a new copper sealing washer on each side of the banjo union.

6 Once the flexible hose is removed examine the internal bore. If clear of fluid it should be possible to see through it. Any specks of rubber which come out, or signs of restriction in the bore, mean that the inner lining is breaking up and the hose must be renewed.

7 Rigid pipes which need replacement can usually be purchased at any local garage where they have the pipe, unions and special tools to make them up. They will need to know the pipe length required and the type of flare used at the ends of the pipe. These may be different at each end of the same pipe.

8 Installation of the pipes is a reversal of the removal procedure. The pipe profile must be pre-set before fitting. Any acute bends must be put in by the garage on a bending machine otherwise there is the possibility of kinking them and restricting the fluid flow.

9 All hose and pipe threads and unions are to metric standards. Screw in new components by hand initially to ensure that the threads are compatible.

10 Remember that a metric hose end fitting seals at the tip of its threaded section and will leave a gap between the hexagon of the end fitting and the surface of the component. Do not attempt to overtighten the hose end fitting in order to eliminate the gap.

11 The hydraulic system must be bled on completion of hose or rigid pipe renewal.

6 Front brake pads – inspection and renewal

Warning: *Some brake pads contain asbestos, and the dust from this is injurious to health if inhaled. Clean the calliper using a rag or by brushing (do not use compressed air) and take precautions against inhalation.*
Note: *Either Girling or DBA (Bendix) callipers may be found fitted to the front wheels. The procedure for both types follows.*

Girling and DBA

1 Raise the front of the vehicle onto axle stands and remove the front road wheels.

2 Inspect the thickness of the brake pad lining material. If the linings are worn to below the minimum thickness given in the specifications, they must be renewed as follows.

Girling callipers

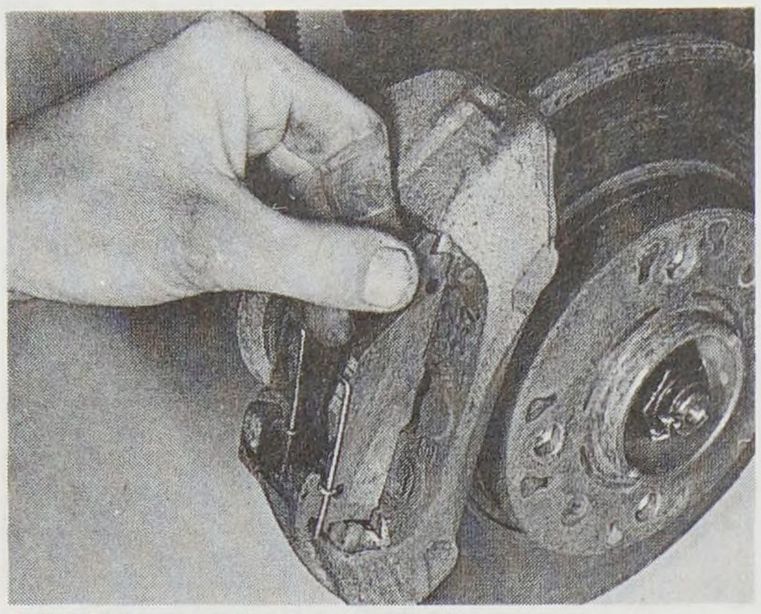
3 Disconnect the brake pad wear indicator lead at its connection, not from the brake pad.

4 Siphon out some of the fluid from the brake fluid reservoir.

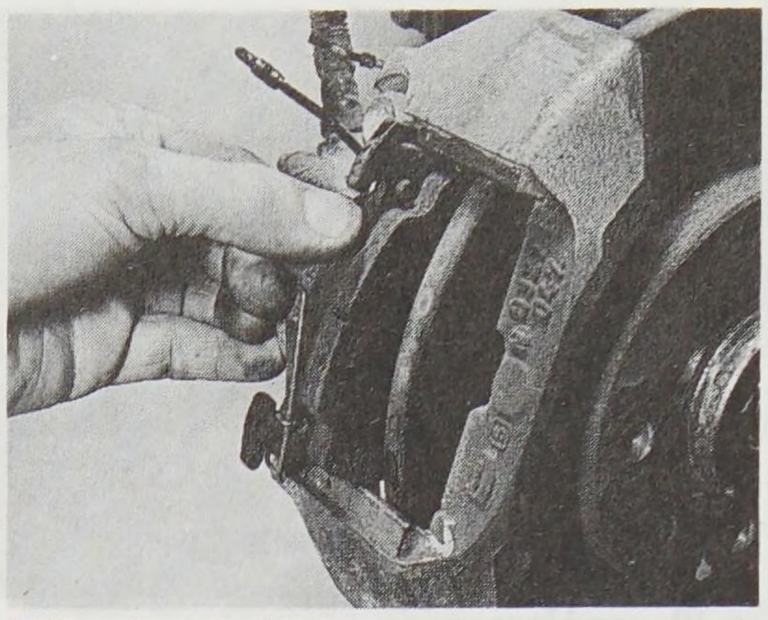
5 Undo and remove the calliper lower guide bolt. Use an open ended spanner on the flats of the calliper guide to prevent it rotating.

6 Hinge the calliper upward.

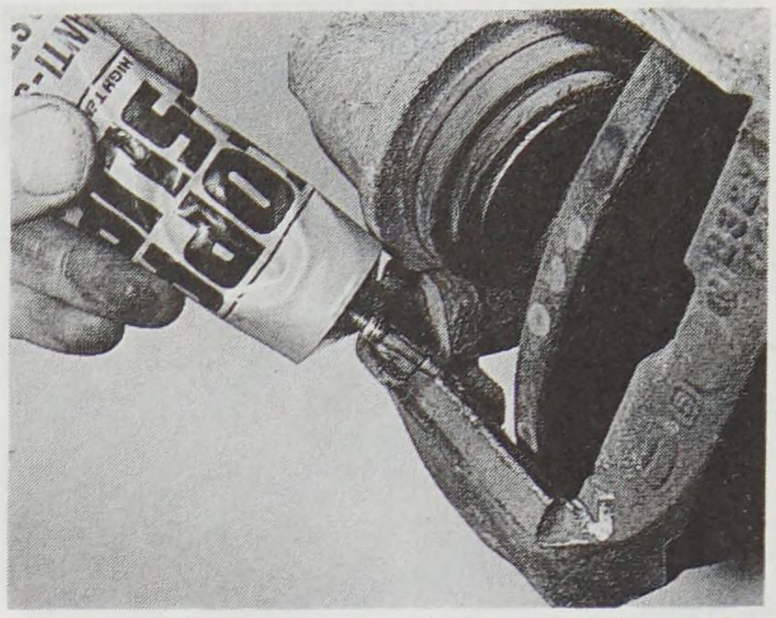
7 Lift out the pads (photos).



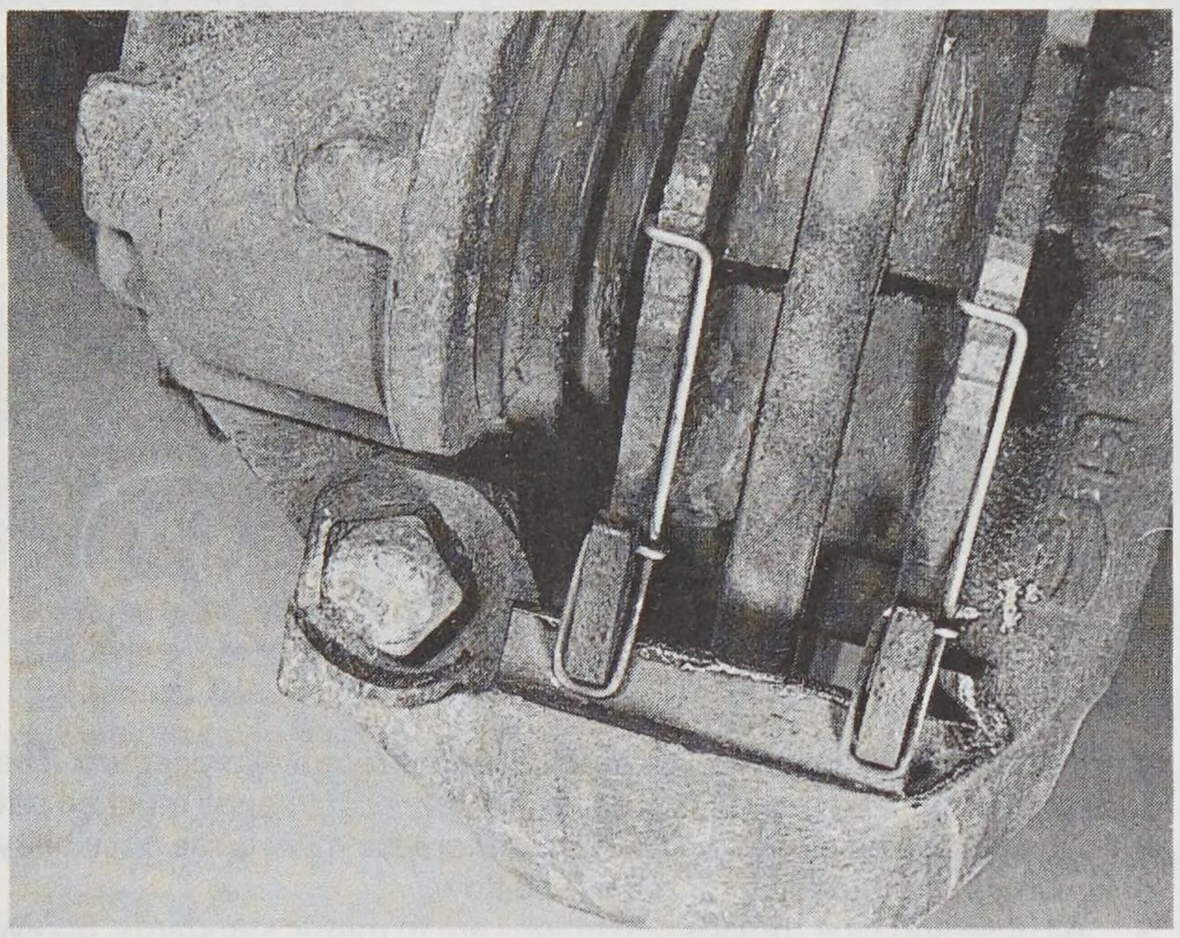
6.22 Remove the outer pad ...



6.23 ... then the inner



6.25 Applying anti-squeal grease to the pad locating clip on the calliper



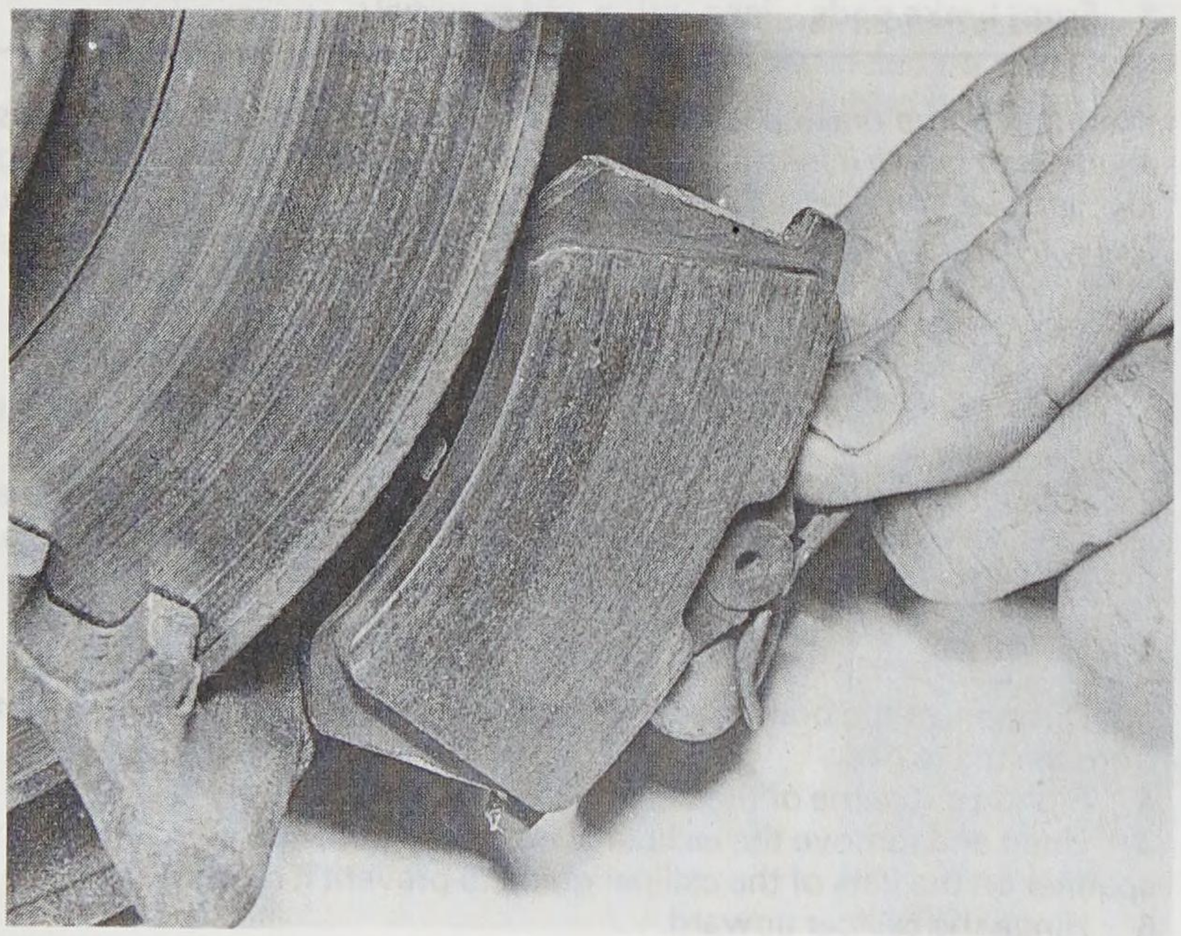
6.26 Correct location of the anti-rattle clips on Bendix brake pads

8 Inspect the calliper piston and calliper guide dust covers for splits and damage and renew as necessary (see Section 10).
9 Also inspect the brake disc (Section 11).
10 Ensure that the calliper guides slide freely.
11 Carefully clean around the calliper and disc, being careful not to inhale brake dust which may contain asbestos.

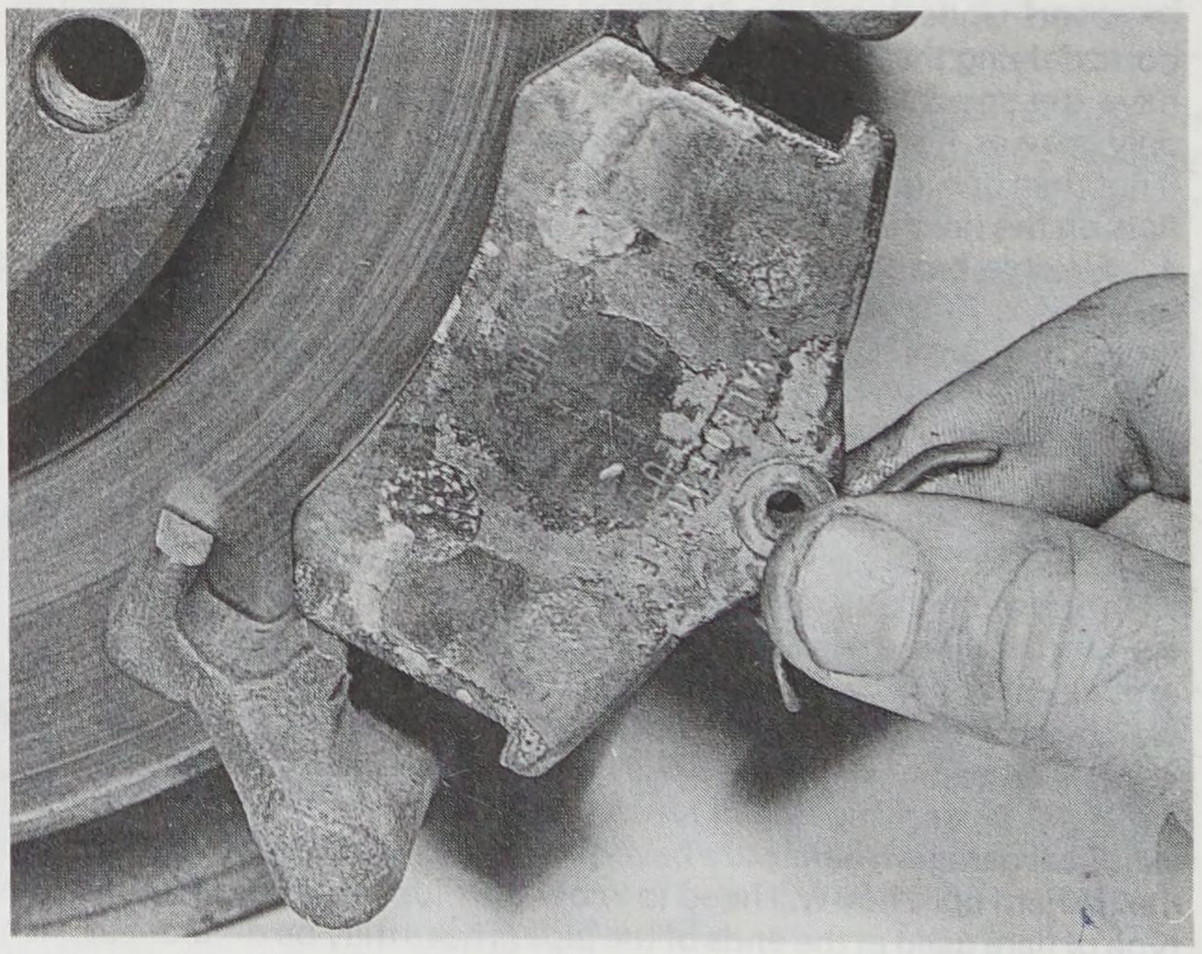
12 Push the piston all the way back into the calliper, keeping an eye on the fluid reservoir which may overflow.
13 Fit the inner pad which has the brake pad wear indicator lead, feeding the lead through the calliper.
14 Fit the outer pad.
15 Swing the calliper down, apply thread locking compound to the guide bolt threads, then fit the bolt and tighten it to the specified torque (photo).
16 Connect the brake pad wear indicator lead, applying grease to the connector, taking care not to get any grease on the braking friction surfaces. A bad connection here and the indicator warning lamp will not illuminate even when the pads are worn.
17 Check and top up the brake reservoir fluid level, operating the brake pedal several times to settle the pads and piston.
18 Refit the roadwheels and remove the vehicle from axle stands.

DBA (Bendix) callipers

19 Disconnect the brake pad wear indicator connection (photo).
20 Remove the locking clip and slide out the key (photos).
21 Push the calliper toward the disc by levering against the suspension strut.
22 Lift out the outer pad (photo).
23 Push the calliper in the opposite direction and lift out the inner pad (photo).
24 Carry out paragraphs 8 to 12 above (with the exception of paragraph 10).
25 Apply anti-squeal grease to the pad locating lip on the calliper (photo).
26 Fit the inner pad (wear indicator lead uppermost), then push the calliper in the opposite direction and fit the outer pad, ensuring the anti-rattle clips are correctly located (photo).



7.8A Fitting the inner pad ...



7.8B ... and outer

27 Fit the key and its locking clip.
28 Carry out paragraphs 16 to 18 above.

7 Rear disc brake pads – inspection and renewal

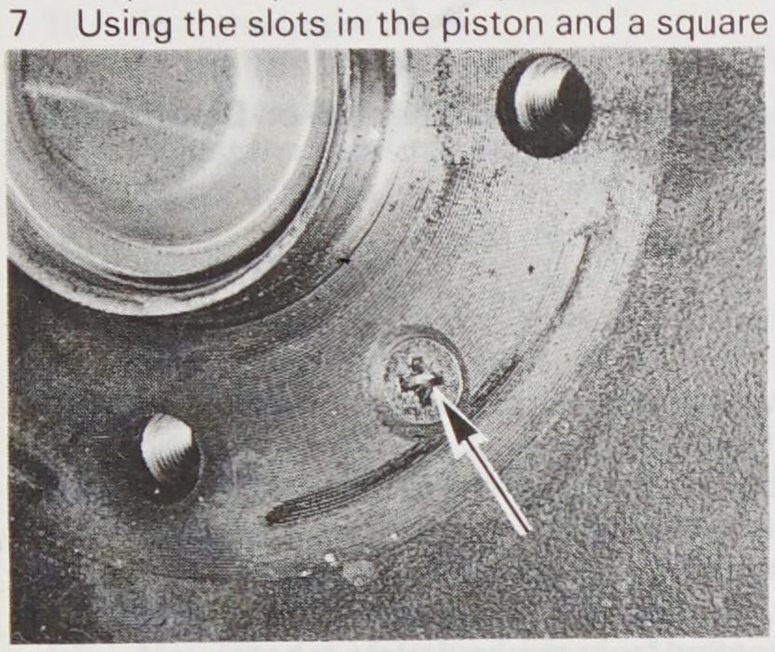
Warning: *Some brake pads contain asbestos, the dust from this is injurious to health if inhaled. Clean the calliper using a rag or by brushing (do not use compressed air) and take precautions against inhalation.*

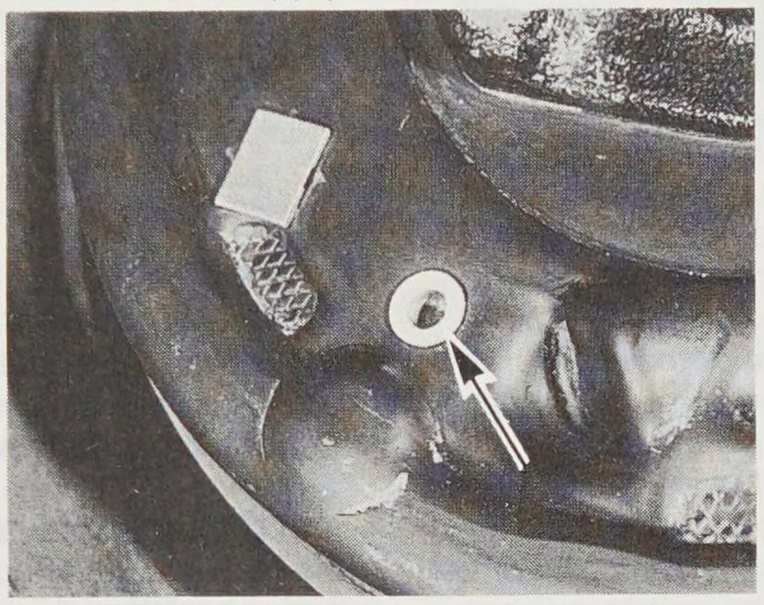
1 Raise the rear of the vehicle onto axle stands and remove the rear wheels.
2 Siphon some of the fluid from the master cylinder reservoir.
3 Release the handbrake and disconnect the handbrake cable from the lever on the calliper.
4 Remove the Torx headed bolt from the calliper upper guide while holding the guide with a spanner to prevent rotation.
5 Swing the calliper down and then lift out the pads.
6 Inspect the pads and calliper as described in Section 6.
7 Using the slots in the piston and a square shank screwdriver apply pressure to the piston and screw it all the way back in to the calliper.
8 Fit new pads, slotting them into the calliper (photos).
9 Swing the calliper back up into position and fit and tighten a new upper guide bolt, having coated its threads with locking compound.
10 Reconnect the handbrake cable.
11 Check and top up the brake fluid level.
12 Refit the roadwheels and remove the vehicle from axle stands.
13 Start the engine then operate the footbrake several times until the action becomes hard. Stop the engine.

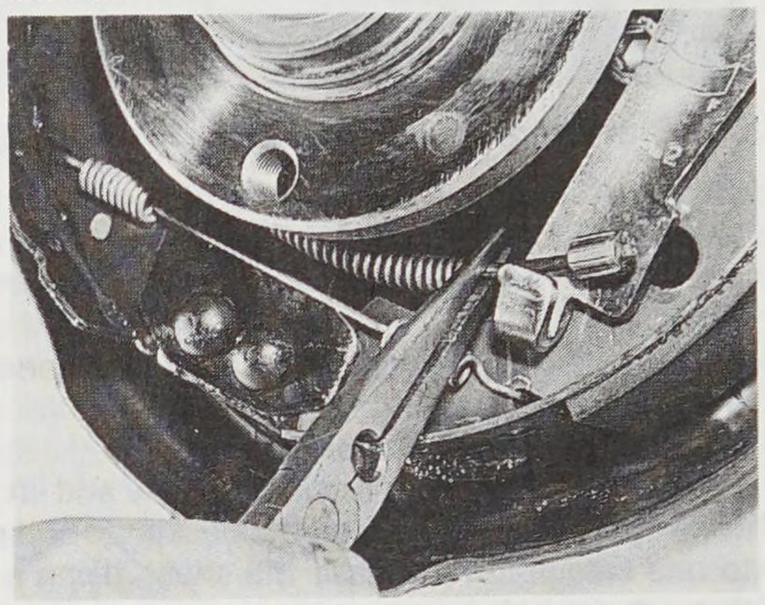
8 Rear drum brake shoes – inspection and renewal

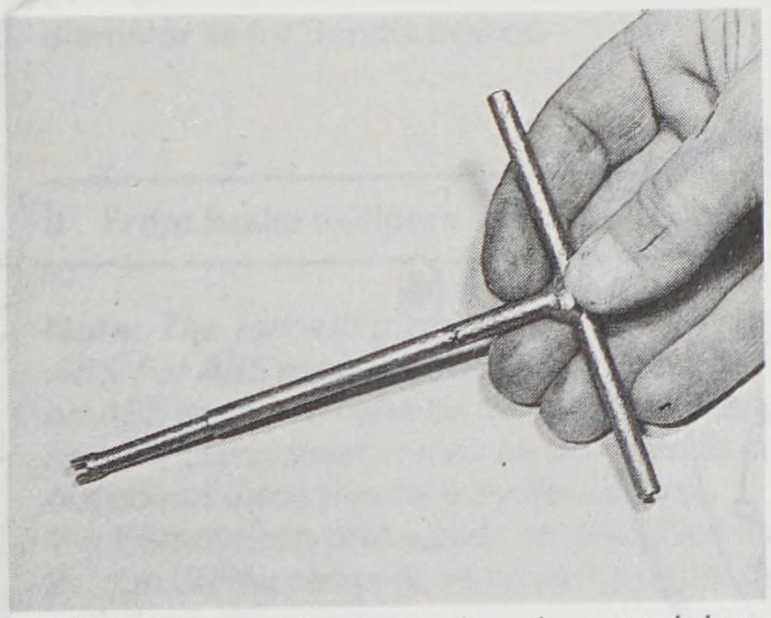
Warning: *Some brake shoes contain asbestos, the dust from this is injurious to health if inhaled. Clean the shoes and drum using a rag or by brushing (do not use compressed air) and take precautions against inhalation.*

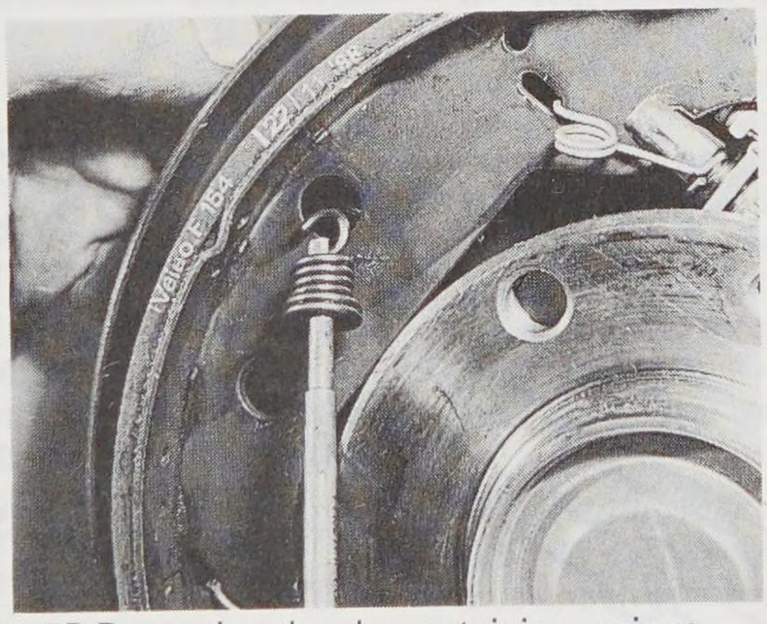
Either Bendix or Girling assemblies may be fitted according to model. The procedure for both is similar.

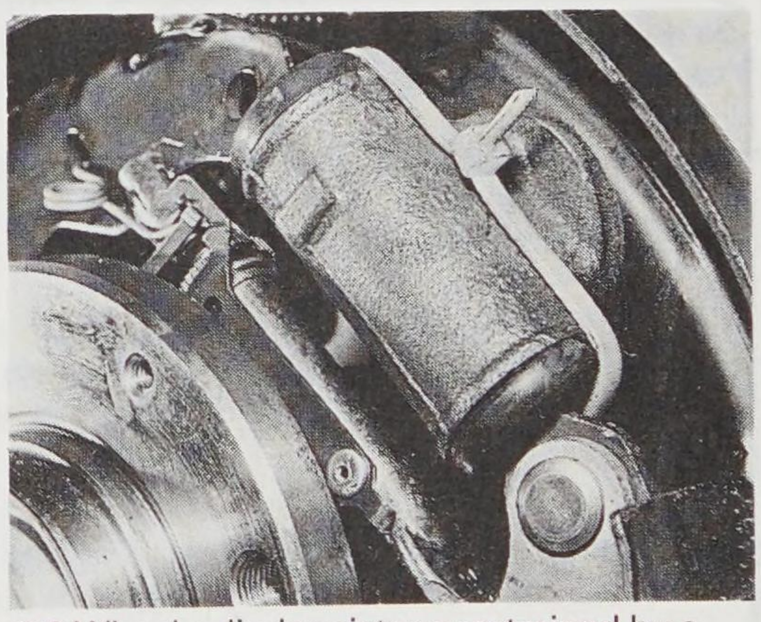

8.3A Rear drum brake drum retaining screw (arrowed)

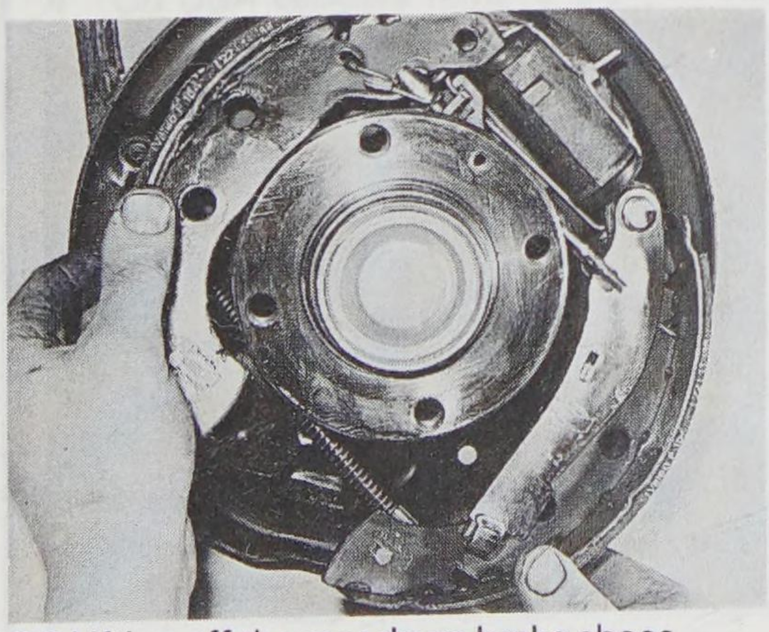

8.3B Plastic plug in backplate (arrowed)

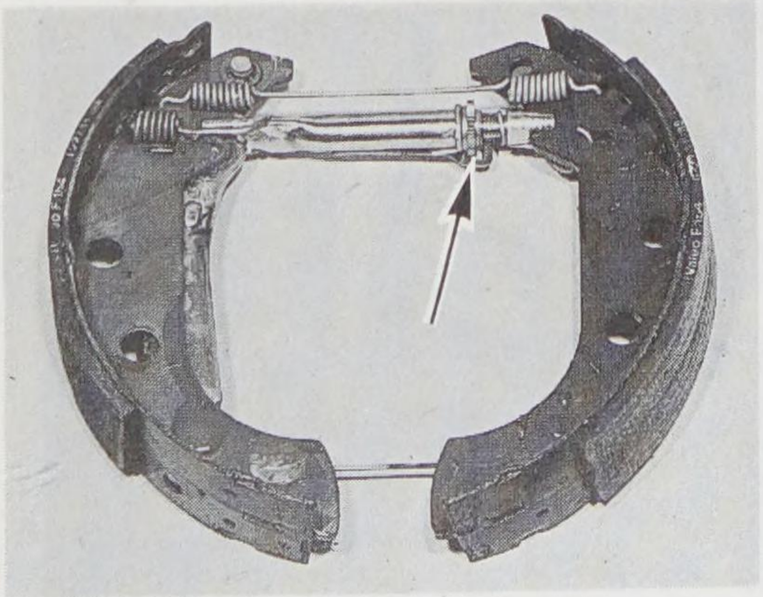

8.6 Disconnecting the handbrake cable from the lever

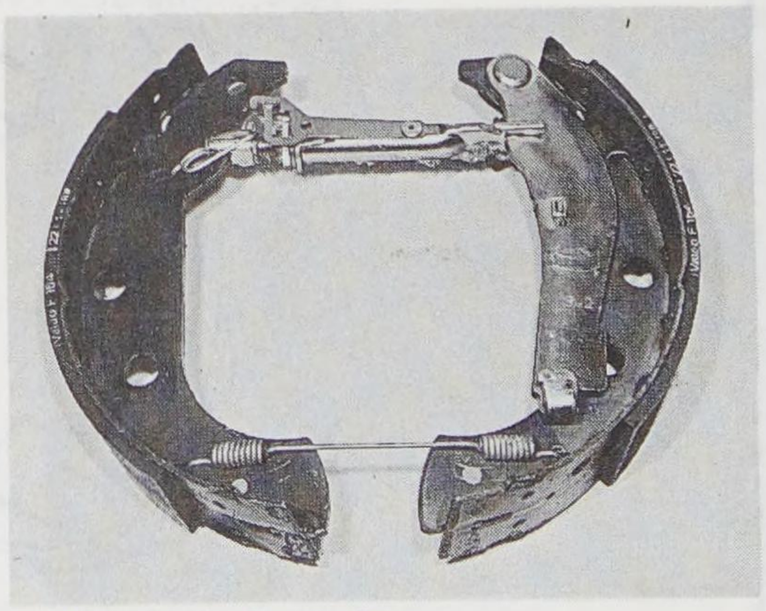

8.7A Forked tool for removing shoe retaining springs

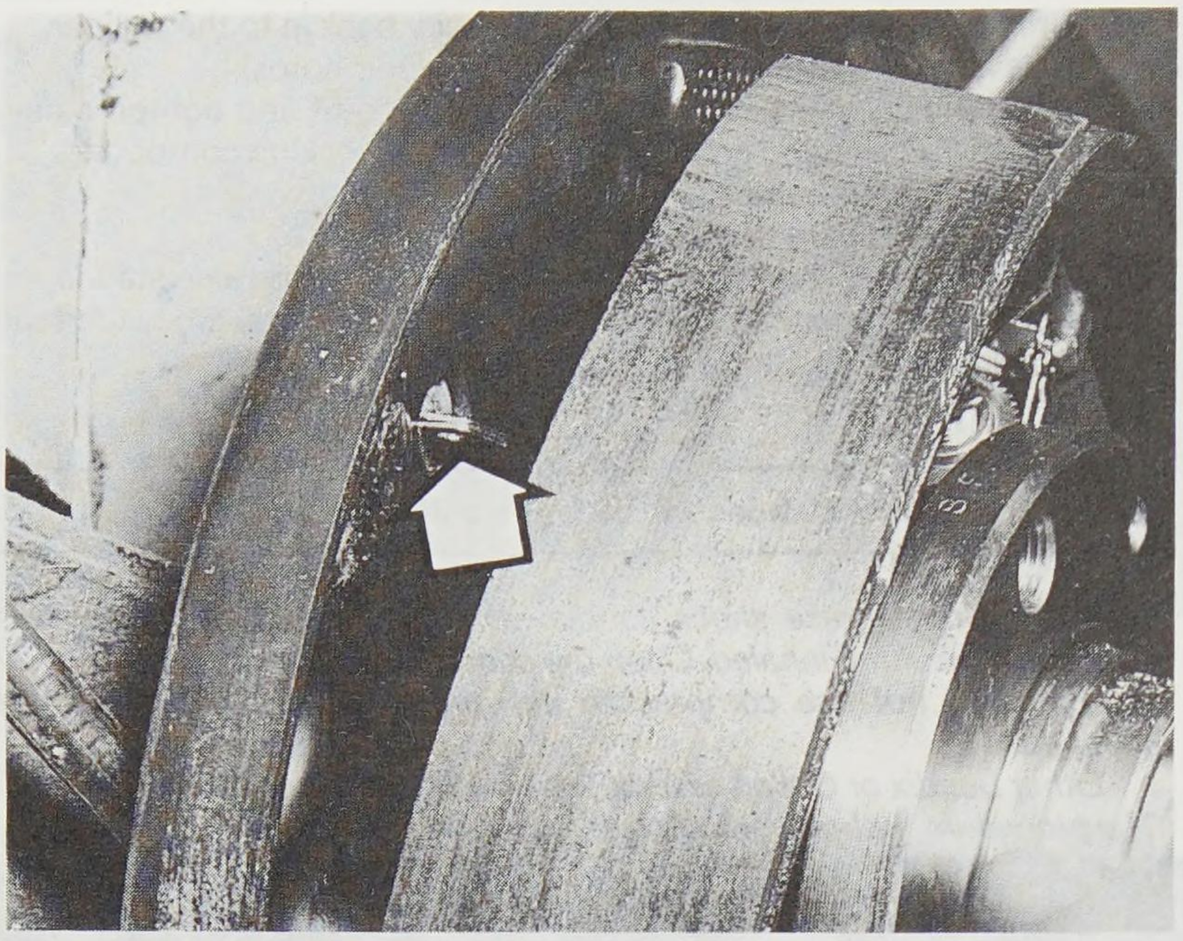

8.7B Removing the shoe retaining springs


8.8 Wheel cylinder pistons restrained by a plastic cable tie


8.9 Lifting off the rear drum brake shoes


8.11A Rear view of the shoe assembly showing correct location of adjuster lever (arrowed) ...


8.11B ... and a front view



8.16 Brake shoe retaining spring bracket on backplate (arrowed)

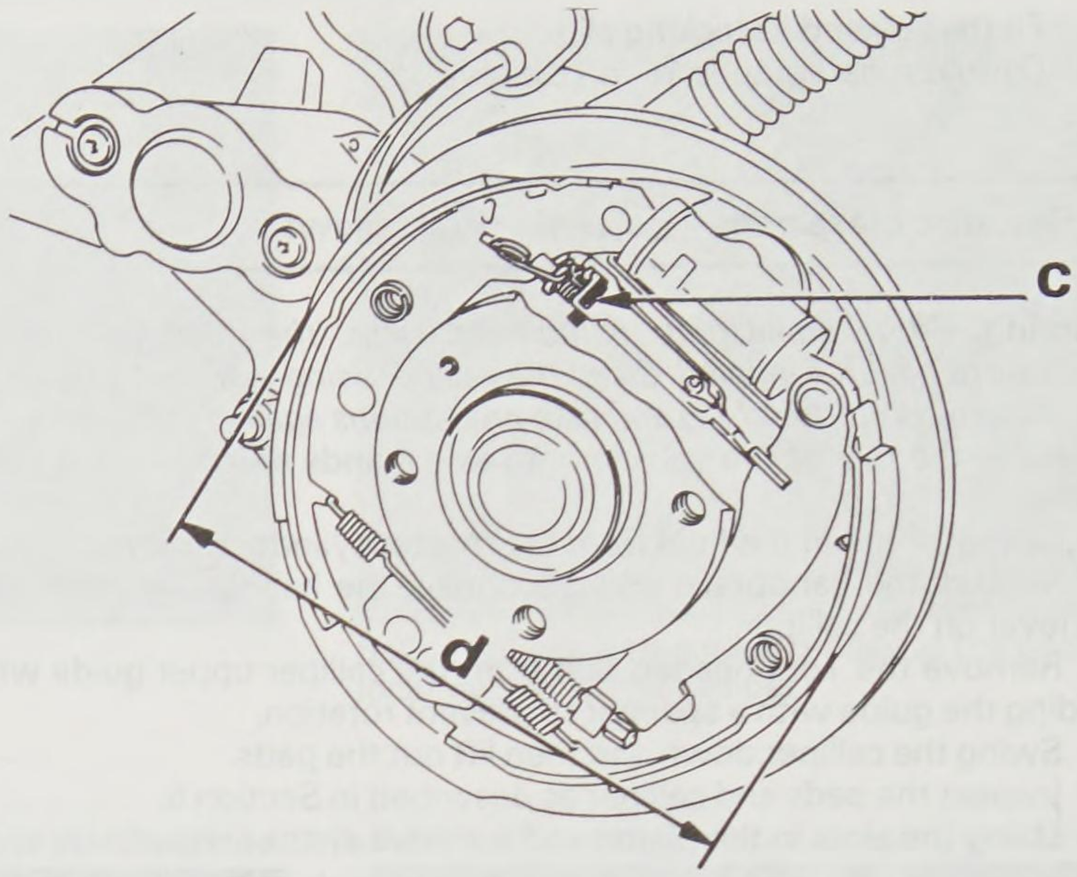


Fig 8.1 'Shoe-diameter' (d) and adjuster wheel (c) on Bendix rear drum brakes (Sec 8)

d = 227.0 mm (8.9 in)

Inspection

1 Raise the rear of the vehicle onto axle stands, chock the front wheels and release the handbrake.
2 Remove the rear wheels.
3 Unscrew the drum retaining screw and lift off the drum. If it is tight, prise out the plastic plug on the backplate and push the handbrake lever to one side to fully release the shoes using a thin bladed screwdriver through the hole (photos).
4 Inspect the shoes for wear. If they are worn down to, or almost to the limit given in the Specifications they must be renewed.

Renewal (Bendix)

5 Refer to Section 19 and slacken off the handbrake cables at the equaliser mechanism.
6 Disconnect the handbrake cable from the lever (photo).
7 Unhook the shoe retaining springs from the backplate using a forked tool similar to that shown (photo). A screwdriver with a notch in the blade is equally effective. The tool is pushed through the centre of the spring and the spring unhooked from the backplate (photo).
8 Restrain the wheel cylinder pistons from ejection. We used a plastic cable tie (photo).

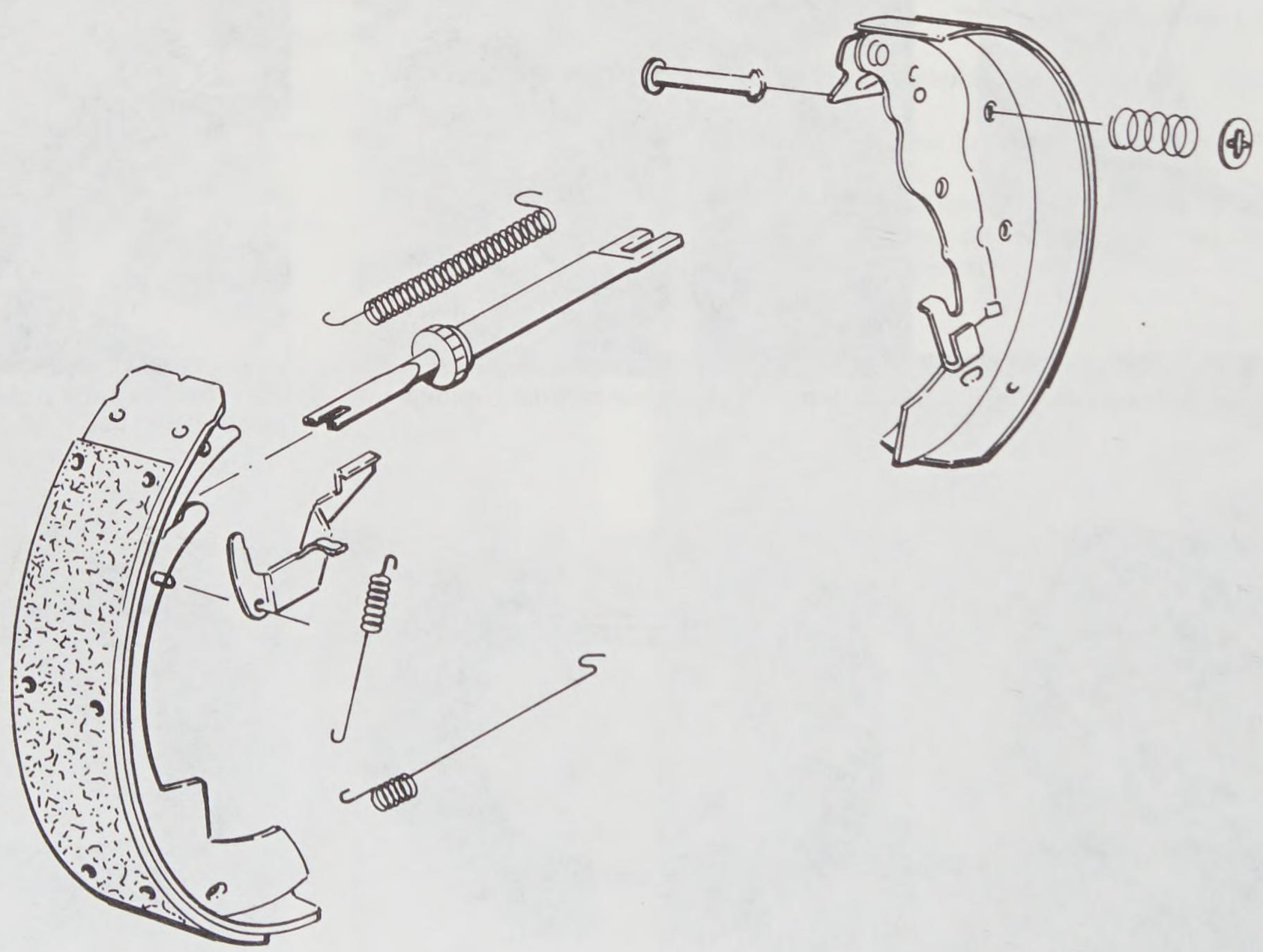


Fig 8.2 Exploded view of Girling rear brake shoes (Sec 8)

9 Unhook and remove the lower shoe return spring, then pull the shoes apart and lift off the shoes, automatic adjuster and handbrake lever assembly (photo).
10 Inspect the wheel cylinder for leakage and check that the piston dust excluders are in good condition. Also inspect the drum (refer to Sections 14 and 15).
11 Transfer the automatic adjuster to the new shoes ensuring it is correctly assembled. The lever must be under the flat spring (photos).
12 Transfer the handbrake lever to the new shoes. It is secured by a circlip.
13 Fit the upper shoe return spring.
14 Fit the assembly back onto the hub, ensuring the noses of the shoes engage in the wheel cylinder piston ends.
15 Fit the lower shoe return spring.
16 Refit the shoe retaining springs, ensuring they are hooked onto the bracket in the backplate (photo).
17 Reconnect the handbrake lever.
18 Turn the adjuster wheel of the automatic adjuster to achieve a 'shoe diameter' as specified in Fig. 8.1.
19 Refit the brake drum.
20 Fit the roadwheels then operate the foot brake several times to settle the drum assemblies.
21 Adjust the handbrake as described in Section 19.
22 Remove the vehicle from axle stands.

Renewal (Girling)

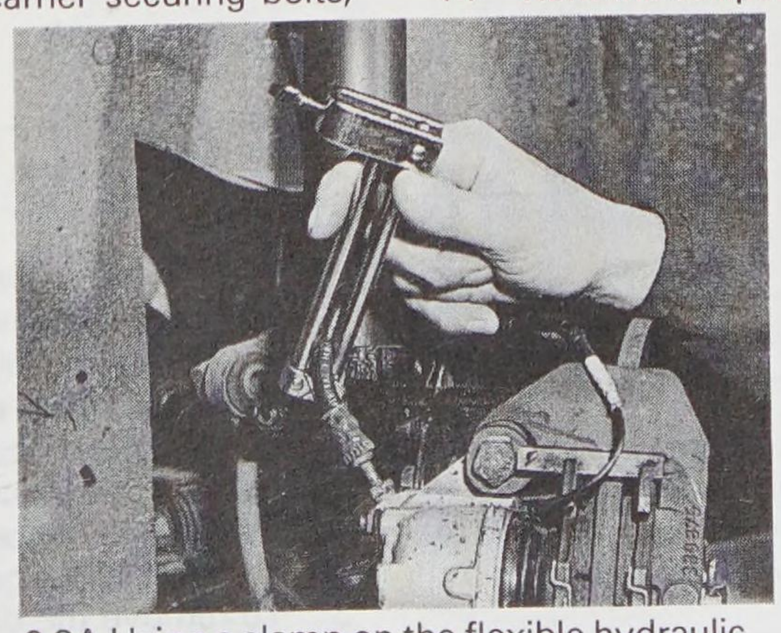
23 The procedure is similar to that described for Bendix brakes but the assembly is slightly different.
24 The shoe retaining springs can be removed by gripping the spring washer with a pair of pliers, depressing the spring and turning the washer through 90° to line up the slots in the washer with the lugs on the retaining spring to release the spring.
25 The lower shoe return spring is fitted with the coils away from the handbrake lever.
26 Note that the automatic adjuster has a right-hand thread on the right-hand side of the vehicle, and a left-hand thread on the left-hand side. If both assemblies are removed at the same time do not mix them up.
27 Set the automatic adjuster to achieve the same brake shoe diameter as for Bendix brakes.

9 Front brake callipers – removal and refitting

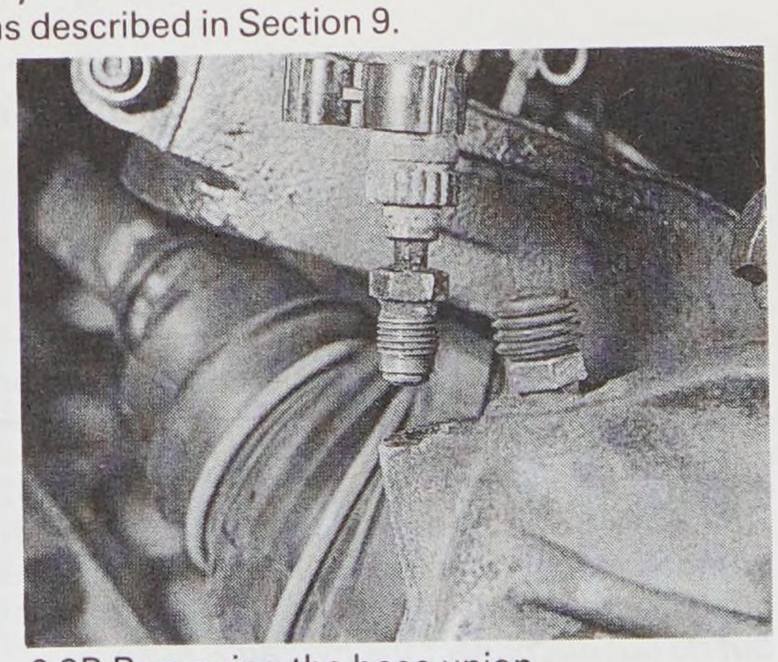
Note: *The following procedure is only applicable to vehicles without ABS. For ABS equipped models, refer to the warning note in Section 26. If on ABS equipped vehicles the calliper is being removed only for access to another component, it may be unbolted as described and tied to one side, but do not disconnect the hydraulic hose.*

1 Remove the brake pads as described in Section 6.
2 On Girling callipers, remove the upper calliper guide bolt (photo) and withdraw the calliper.
3 Clamp the flexible hydraulic hose as near as is possible to the union on the calliper, then loosen the union nut and unscrew the calliper from the hose (photos).
4 On DBA callipers remove the two calliper carrier securing bolts, withdraw the calliper, then undo the flexible hose as described above.
5 Refitting is a reversal of removal using thread locking compound on the guide bolts (Girling) or calliper carrier securing bolts (DBA) and tighten all bolts to the specified torque.
6 On completion bleed the brake system as described in Section 4.

9.2 Removing the upper guide bolt on a Girling calliper



9.3A Using a clamp on the flexible hydraulic hose



9.3B Removing the hose union

10 Front brake callipers – overhaul

Note: *The following procedure is only applicable to vehicles without ABS. For ABS equipped models, refer to the warning note in Section 26. Overhaul kits containing all the necessary seals and grease are available from dealers.*

1 Remove the calliper as described in Section 9 and clean it thoroughly.

Girling callipers

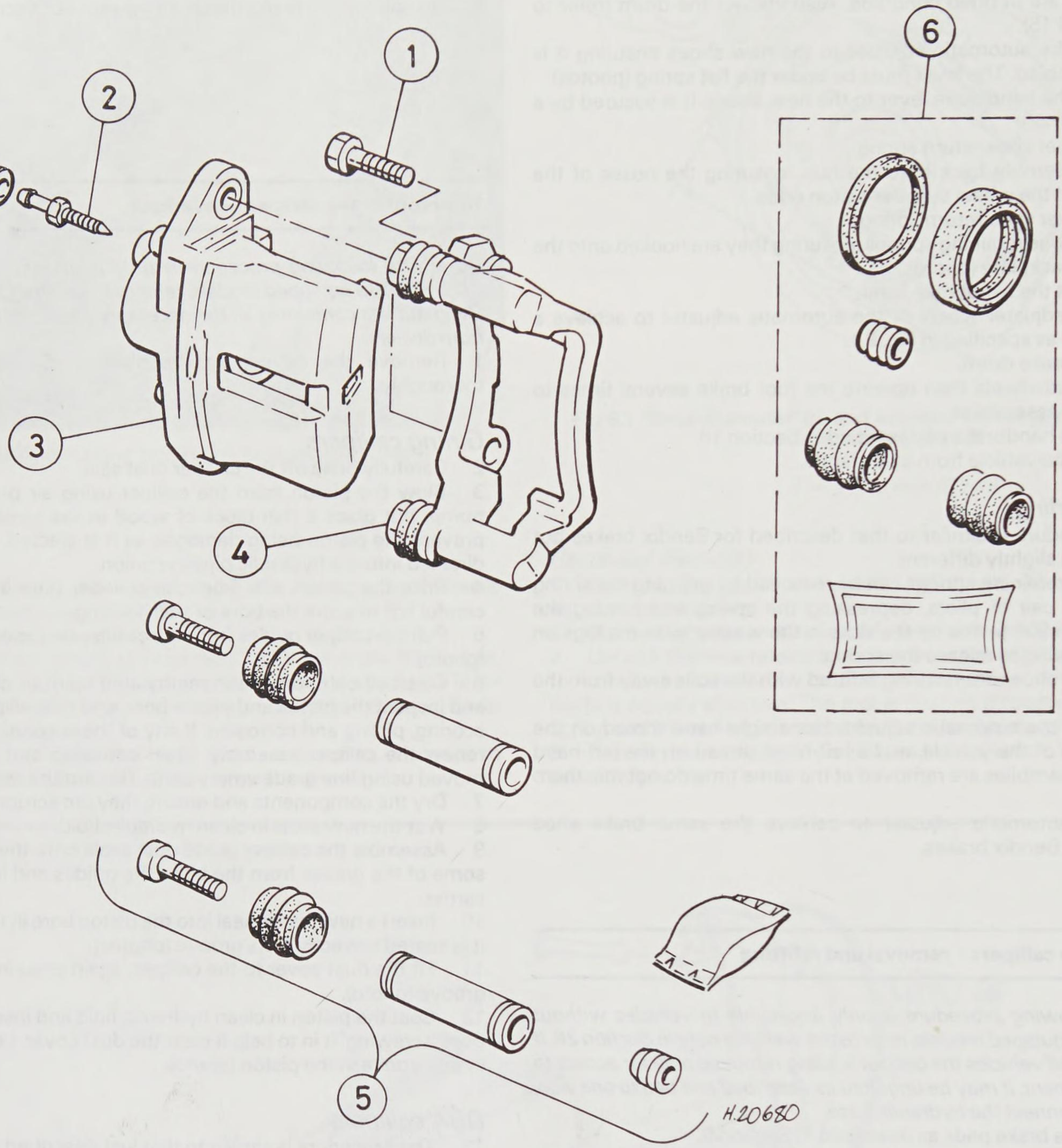
2 Carefully prise off the calliper dust seal.
3 Blow the piston from the calliper using air pressure from a foot pump, but place a thin block of wood in the throat of the calliper to prevent the piston being damaged as it is ejected. The air pressure is directed into the hydraulic pipeline union.
4 Prise the piston seal from the cylinder bore in the calliper being careful not to score the bore or seal housing.
5 Pull the calliper guides from the calliper carrier on the hub assembly (photo).
6 Clean all components in methylated spirit or clean hydraulic fluid and inspect the piston and piston bore, and the calliper guides for wear, scoring, pitting and corrosion. If any of these conditions are excessive, renew the calliper assembly. Light corrosion and scoring can be removed using fine grade emery cloth. Discard the seals.
7 Dry the components and ensure they are scrupulously clean.
8 Wet the new seals in clean hydraulic fluid.
9 Assemble the calliper guide dust seals onto the guides, then apply some of the grease from the kit to the guides and insert them into the carrier.
10 Insert a new piston seal into the piston bore in the calliper ensuring it is seated correctly in its groove (photos).
11 Fit the dust cover to the calliper, again ensuring it is located in its groove (photo).
12 Coat the piston in clean hydraulic fluid and insert it into the piston bore 'screwing' it in to help it clear the dust cover. Locate the dist cover in the groove in the piston (photo).

DBA callipers

13 The procedure is similar to that just described for Girling callipers, but unbolt and separate the cylinder assembly from the carrier before dismantling.

Girling and DBA callipers

14 Refit the callipers as described in Section 9.



1 Carrier bolt
2 Bleed nipple
3 Calliper
4 Carrier
5 Guide assembly
6 Repair kit

Fig 8.3 Exploded view of Girling front calliper (Sec 10)

11 Front brake disc – inspection, removal and refitting

Note: *The following procedure is only applicable to vehicles without ABS. For ABS equipped models, refer to the warning note in Section 26. If on ABS equipped vehicles the calliper is being removed only for access to another component, it may be unbolted as described and tied to one side, but do not disconnect the hydraulic hose*

1 Remove the calliper as described in Section 9, but do not disconnect the hydraulic hose. Tie the calliper back out of the way without straining the hose.

2 Inspect the disc for cracks, scoring pitting and corrosion. Insert a feeler blade between the carrier and the disc (Girling callipers), rotate the disc and check it for excessive run-out. If the run-out exceeds the limit given in the Specifications, or the other conditions are excessive, the disc can be resurfaced provided that the minimum thickness is not exceeded in the process. If working on DBA callipers, it will be necessary to use a dial gauge to check the run-out.

3 To remove the disc first unbolt and remove the calliper carrier on Girling types only (photo).

4 Unscrew the disc retaining screws and lift off the disc (photos).

5 Refitting is a reversal of removal.

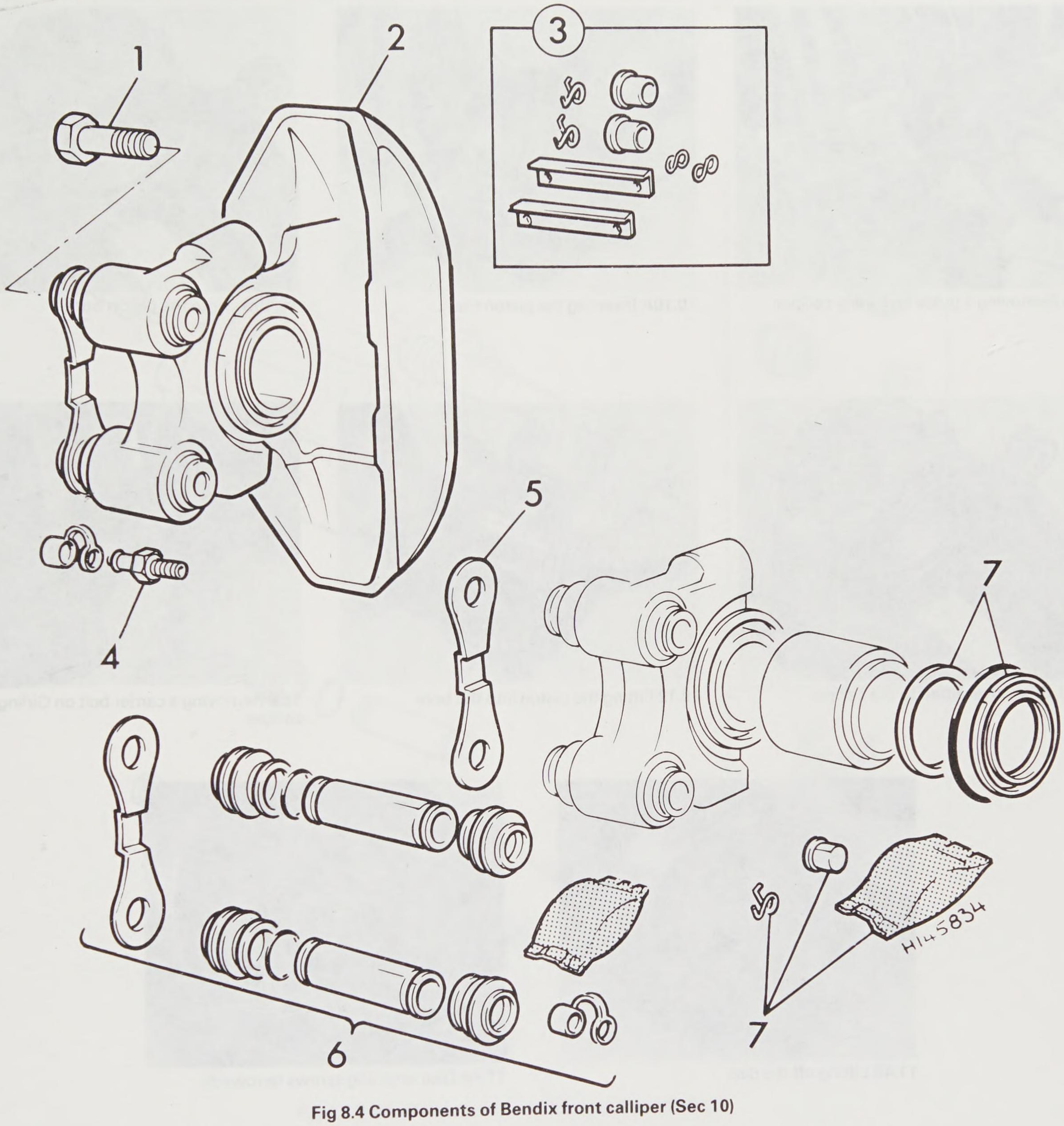


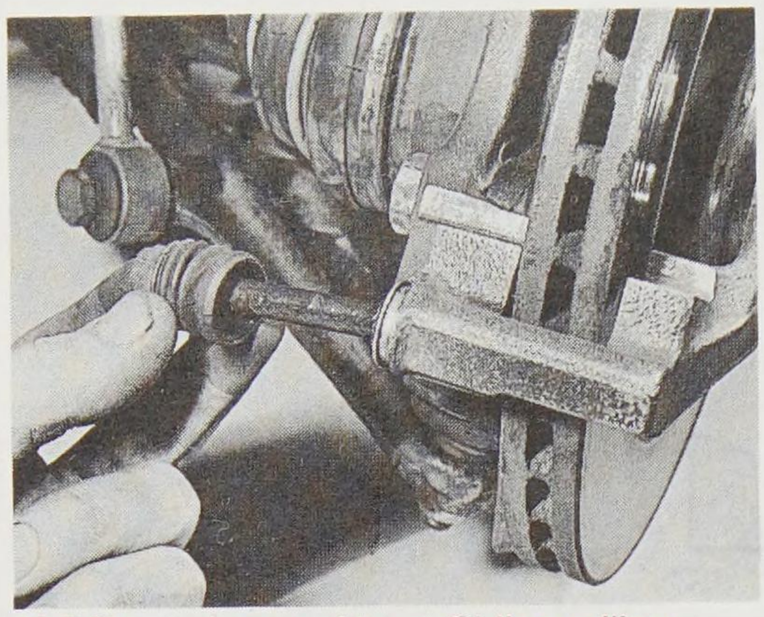
Fig 8.4 Components of Bendix front calliper (Sec 10)

1 Guide bolt
2 Calliper assembly
3 Sliding key kit
4 Bleed nipple
5 Retaining plate
6 Guide assembly
7 Repair kit

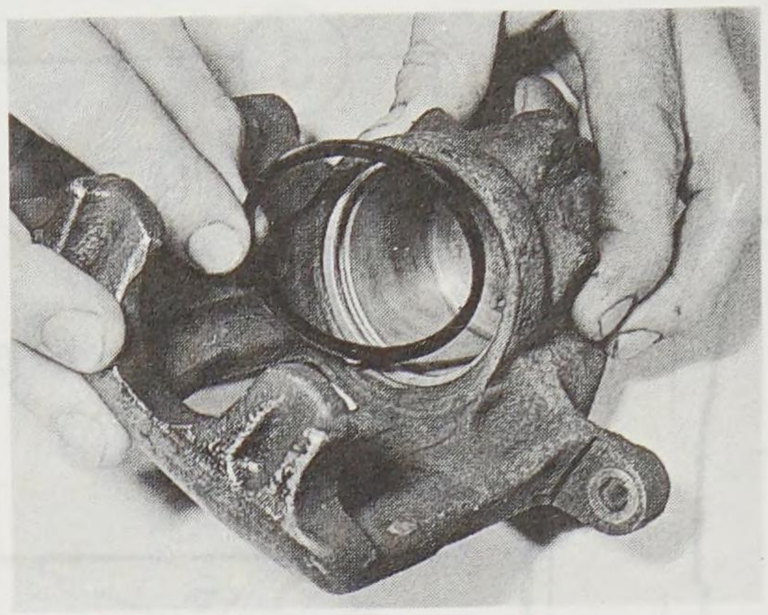
12 Rear disc brake calliper – removal, overhaul and refitting

Important: *To avoid the lengthy bleeding process when removing a calliper for reasons other than calliper overhaul, wherever possible DO NOT disconnect the hydraulic lines, but remove the calliper guide bolts and tie the calliper out of the way. If a new calliper is being fitted, note that it comes already filled with fluid, but the bleeding process must still be carried out.*

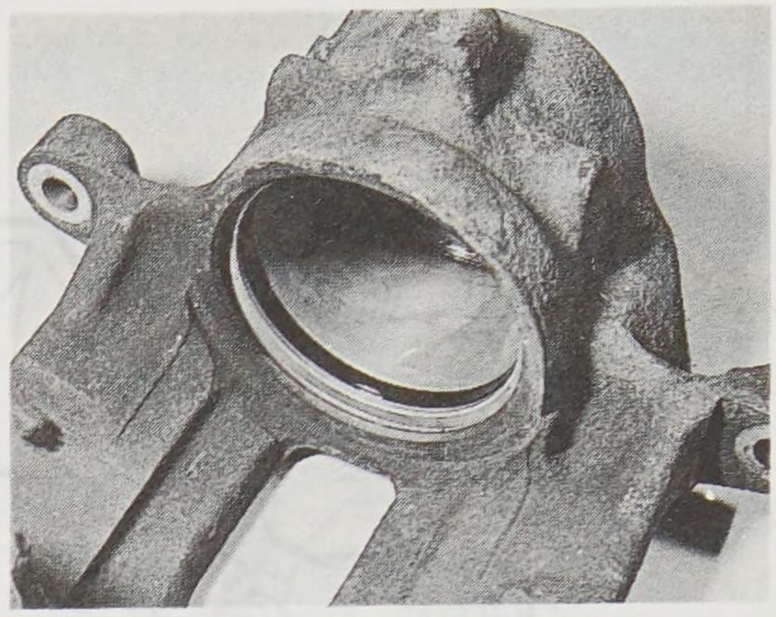
1 Remove the brake pads as described in Section 6.
2 Clamp the flexible hydraulic hose as near as possible to the calliper, then slacken the hose union at the calliper.
3 Remove the calliper lower guide bolt, lift off the calliper and unscrew the hose.
4 Unscrew the piston using a square section bar which will fit the cut-outs in the piston until the piston can be removed from the cylinder.
5 Prise the dust seal from the piston and the piston seal from the cylinder, bering careful not to score the piston or cylinder bore.
6 Remove the calliper guides and discard the dust covers and O-ring seals.
7 Wash all parts in clean hydraulic fluid and dry with lint-free cloth.
8 Inspect the parts for wear, scores and corrosion. Light scoring and corrosion can be removed using fine emery cloth, but anything more serious will mean calliper renewal. The calliper must also be renewed if leakage from the handbrake mechanism plunger is evident. Special tools are required to dismantle the mechanism.
9 Purchase a new set of seals and calliper guide bolts which are obtainable from Peugeot dealers.
10 Lubricate the seals in clean hydraulic fluid.
11 Fit the piston seal into the groove in the cylinder bore ensuring it is located correctly.



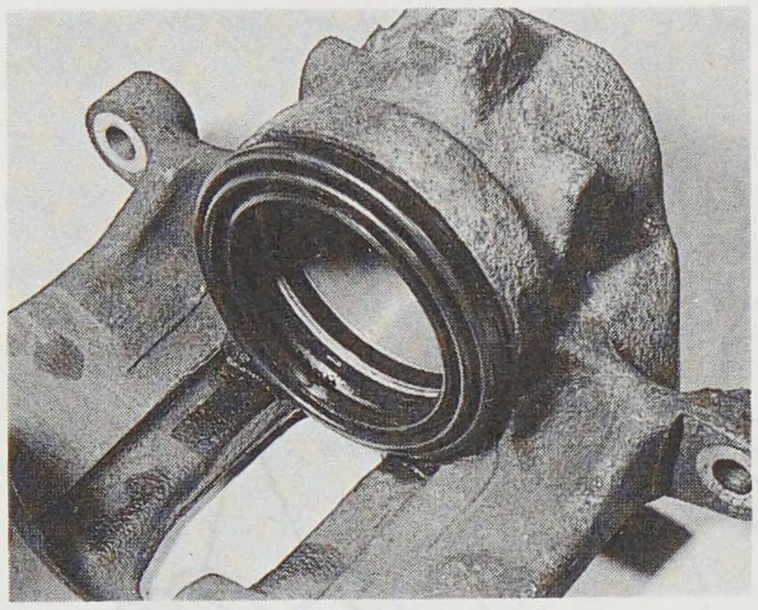
10.5 Removing a guide on Girling calliper



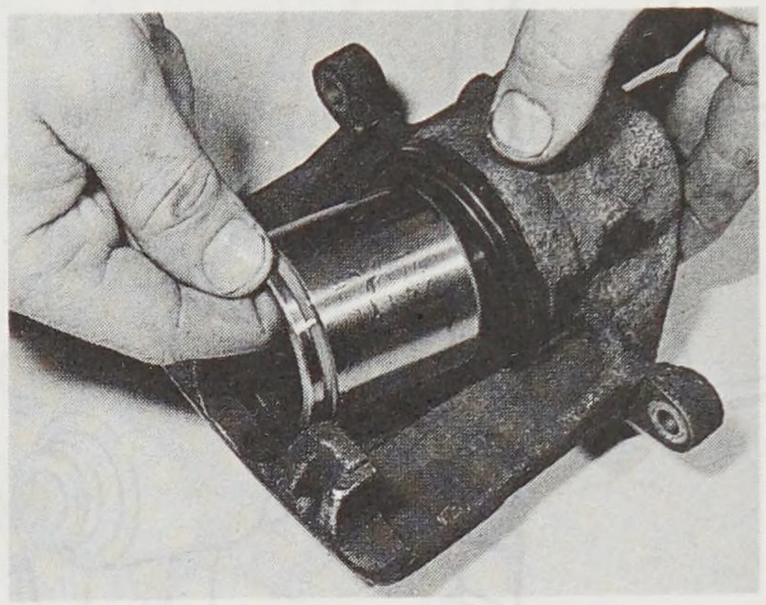
10.10A Inserting the piston seal ...



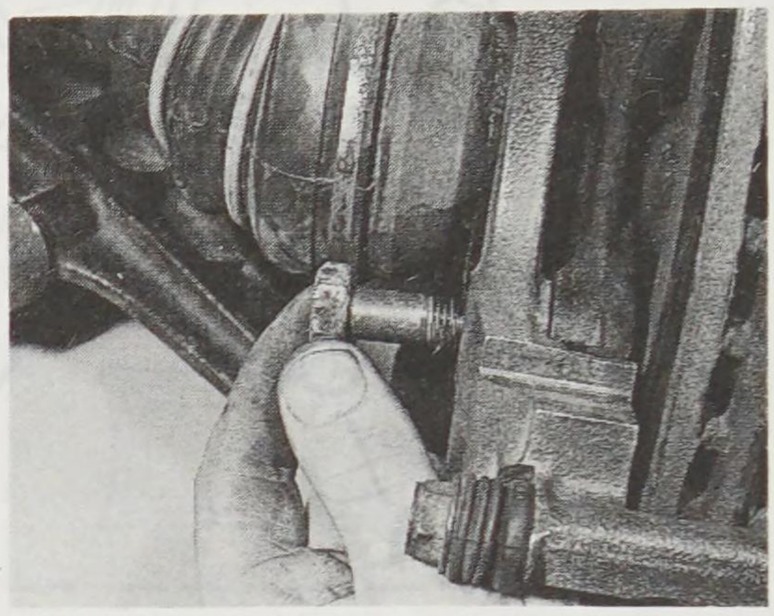
10.10B ... into the piston bore



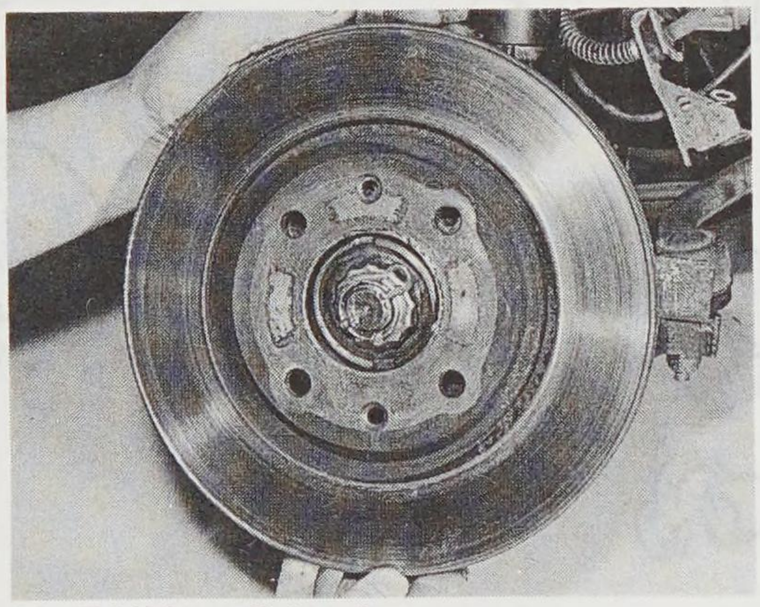
10.11 Dust cover fitted to the calliper



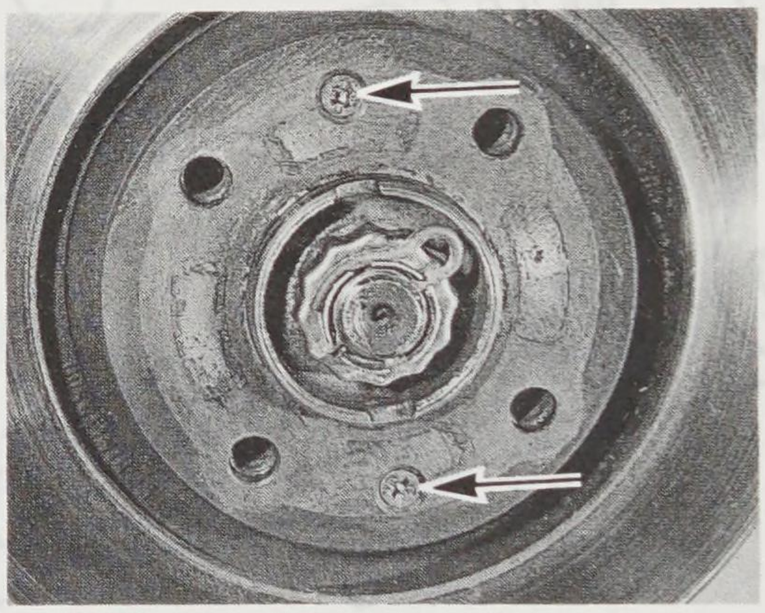
10.12 Fitting the piston into the bore



11.3 Removing a carrier bolt on Girling calliper



11.4B Lifting off the disc



11.4A Disc retaining screws (arrowed)

12 Fit the dust excluder to the piston. Smear some hydraulic fluid around the piston, then offer the piston to the cylinder.
13 Screw the piston all the way onto the handbrake mechanism plunger and into the cylinder. Manipulate the dust excluder lip into the groove on the cylinder.
14 Lubricate the calliper guides with brake grease, then fit the O-ring seals and dust excluders and fit the guides to the calliper.
15 If removed, fit and tighten the bleed nipple.
16 The calliper must now be filled with hydraulic fluid otherwise satisfactory bleeding cannot be achieved with the calliper fitted.
17 To fill the calliper, hold it with the brake hose entry point uppermost and use a clean syringe to squirt clean hydraulic fluid into the cylinder through the hose entry.
18 Once the calliper is full, keep the entry point uppermost and screw in and tighten the flexible hose union.
19 The calliper must now be bled free of air before refitting to the carrier, as follows.
20 Raise the right-hand trailing arm on a jack to activate the pressure regulator valve.
21 Position the calliper with the bleed nipple uppermost and keep it in this position during the whole operation.
22 Place a block of wood approximately 20 mm thick into the 'throat' of the calliper to prevent the piston being ejected.
23 Bleed the calliper, using one of the methods described in Section 4 until it is free of air. Ensure during the bleeding that the piston is forced out against the block of wood.
24 Open the bleed screw approximately half a turn then carefully screw the piston all the way back into the cylinder. Tighten the bleed nipple.
25 Repeat paragraphs 23 and 24.
26 Refit the calliper and brake pads, which is a reversal of removal, using the new calliper guide bolts with locking compound applied to their threads.
27 Fit the roadwheels and remove the vehicle from jacks.

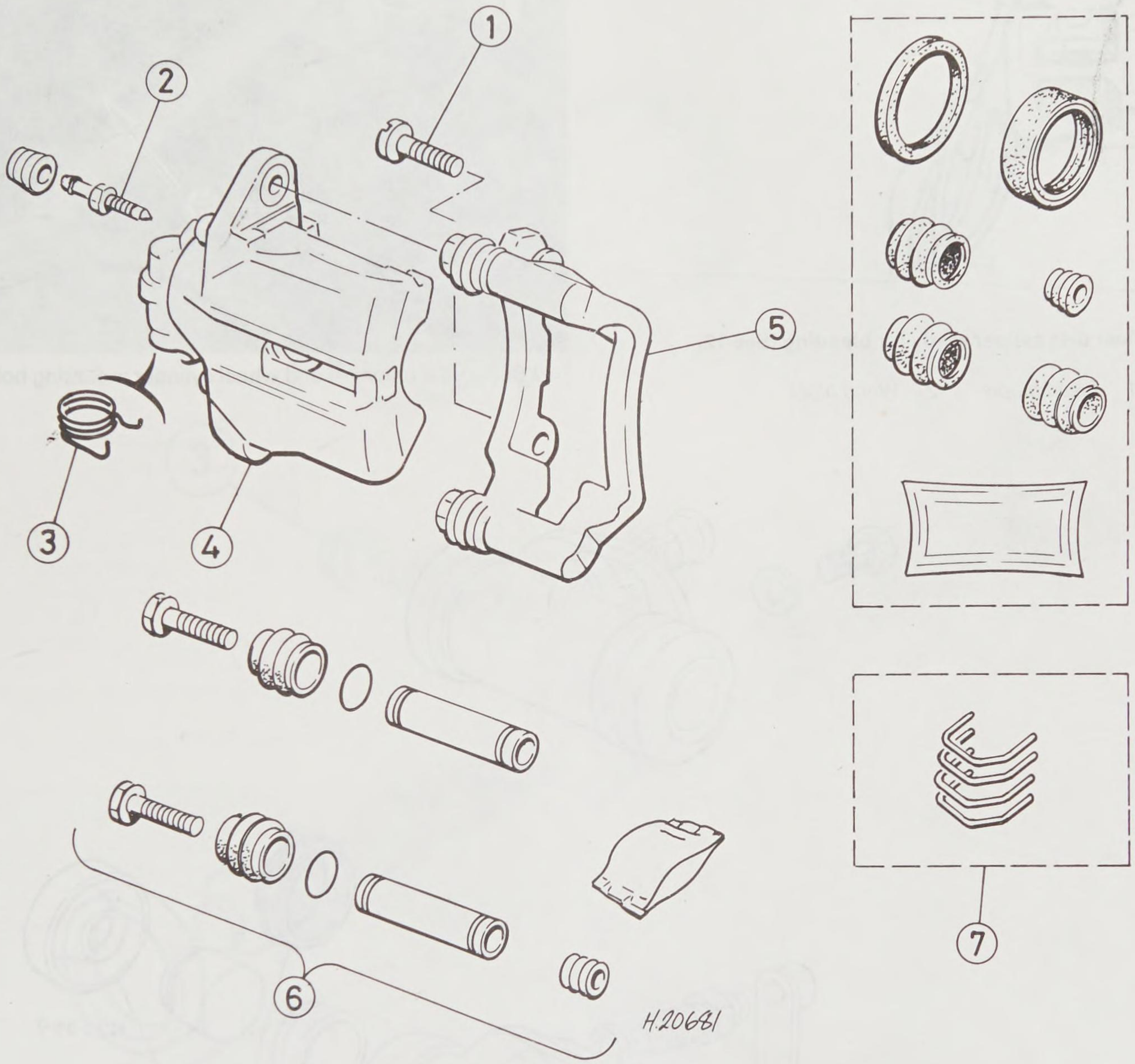


Fig 8.5 Exploded view of rear Girling calliper (Sec 12)

1 *Carrier bolt*
2 *Bleed nipple*
3 *Handbrake lever spring*
4 *Calliper*
5 *Carrier*
6 *Guide assembly*
7 *Repair kit*

13 Rear brake disc – inspection, removal and refitting

1 The procedure is basically as described in Section 11 except that the handbrake cable must be disconnected and note that there is only one disc retaining screw.

14 Rear drum brake wheel cylinder – removal, overhaul and refitting

1 First of all, chock the front wheels then jack up the rear of the car.
2 Remove the drum, as described in Section 8.
3 Note the location of the brake shoe upper return spring then unhook and remove it.
4 Pull the handbrake lever on the rear shoe fully forwards so that the upper ends of the shoes are clear of the wheel cylinder. Wedge the lever in this position using a block of wood.
5 Fit a brake hose clamp to the flexible hose supplying the rear brakes. Alternatively remove the brake fluid reservoir filler cap and tighten it down onto a piece of polythene sheeting to reduce the loss of fluid when disconnecting the wheel cylinder.
6 Unscrew the hydraulic pipe union nut from the rear of the wheel cylinder.
7 Unscrew the two mounting bolts and withdraw the wheel cylinder from the backplate (photo). Take care not to spill any brake fluid on the brake shoe linings.

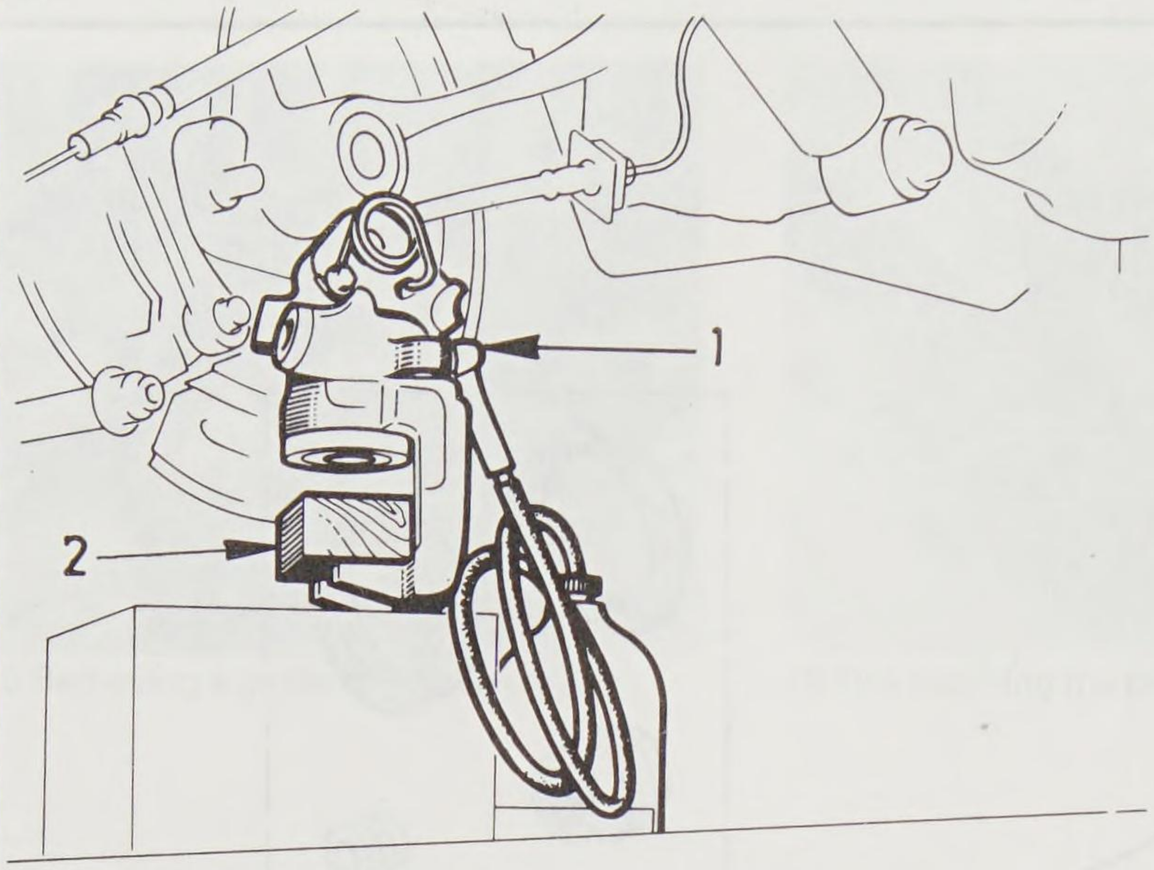
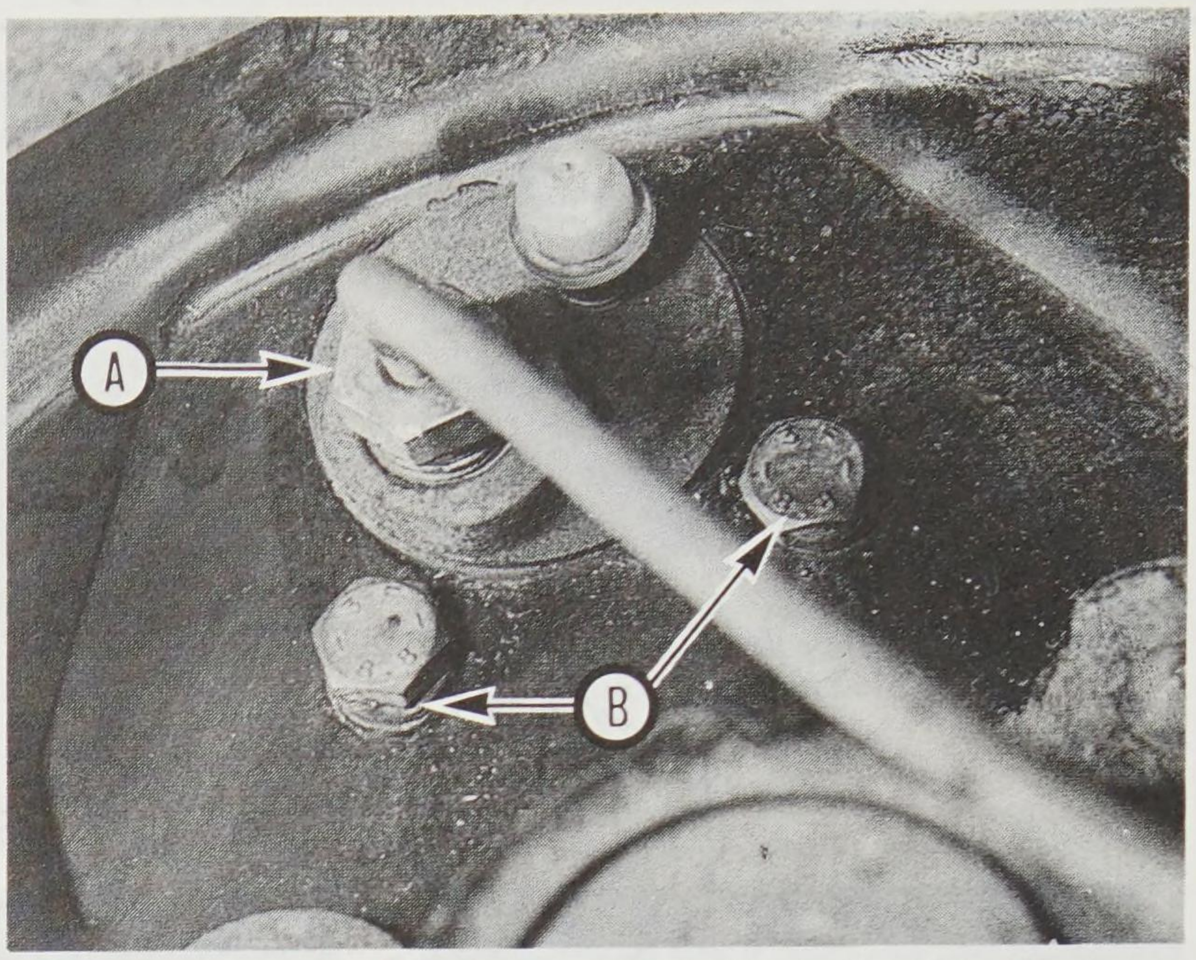
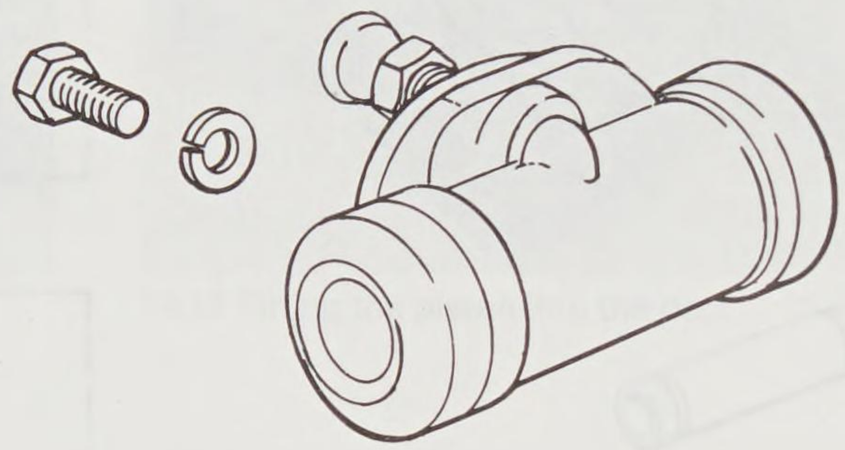


Fig 8.6 Rear disc caliper ready for bleeding (Sec 12)

1 Bleed nipple 2 Wood block



14.7 Brake pipe union (A) and wheel cylinder mounting bolts (B)



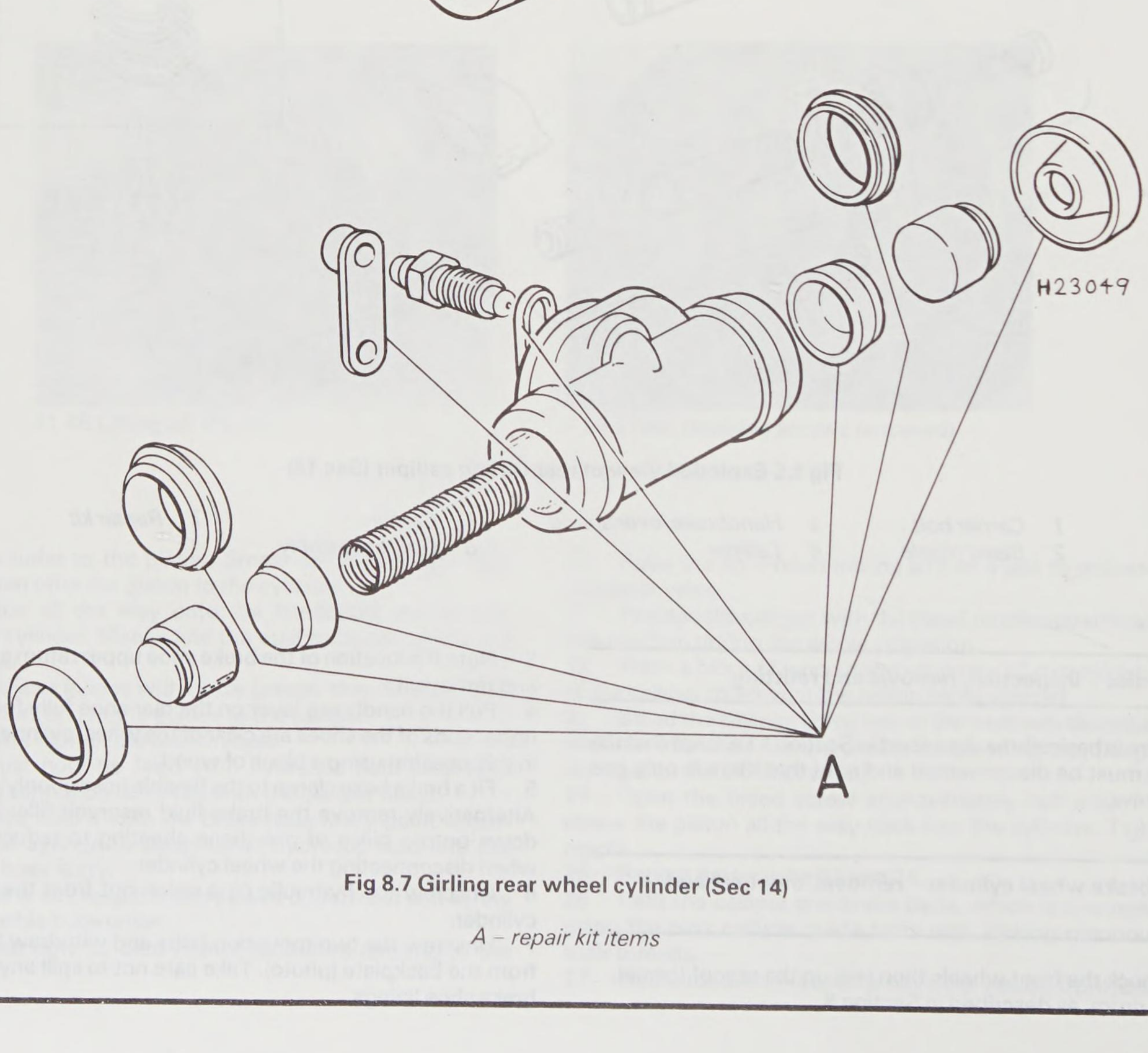


Fig 8.7 Girling rear wheel cylinder (Sec 14)

A – repair kit items

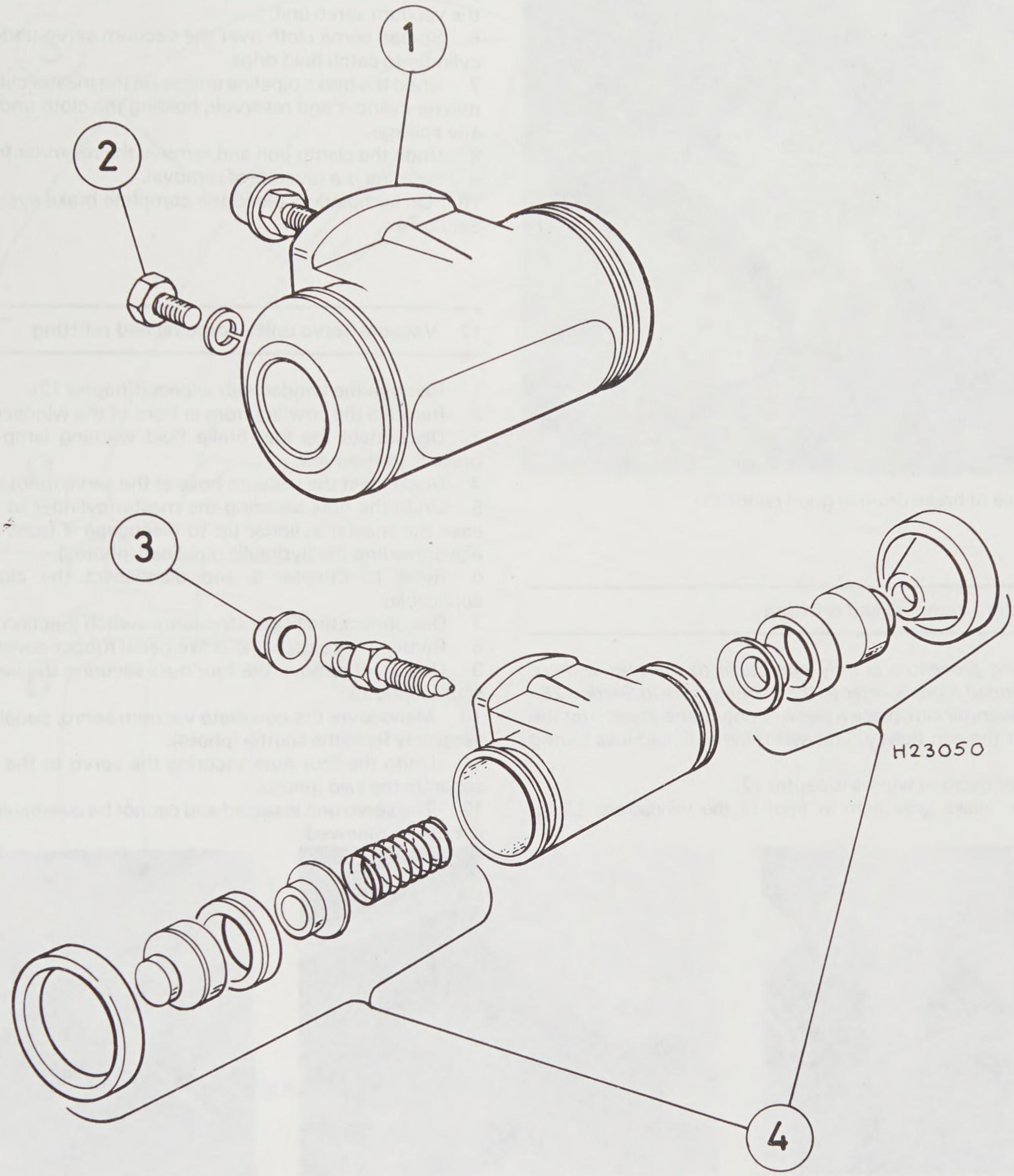


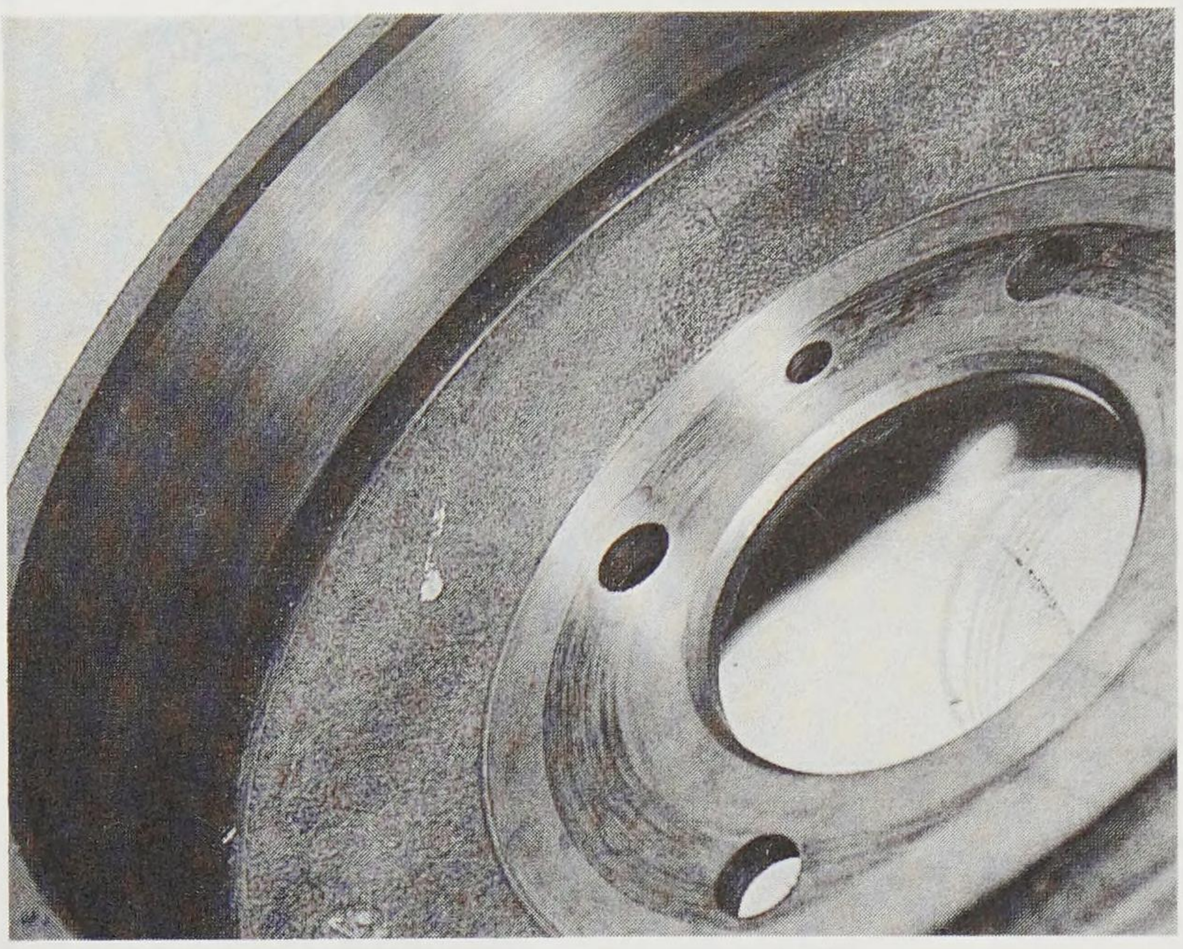
Fig 8.8 Bendix rear wheel cylinder (Sec 14)

1 Cylinder 2 Retaining bolt 3 Bleed nipple 4 Pistons and seals

8 Clean the exterior of the wheel cylinder.
9 Pull off the dust excluders.
10 Extract the pistons, seals and return spring; keeping each component identified for location.
11 Check the surfaces of the cylinder bore and pistons for scoring and corrosion and, if evident, renew the complete wheel cylinder. If the components are in good condition discard the seals and obtain a repair kit which will contain all the necessary renewable components.
12 Clean the pistons and cylinder with methylated spirit or clean brake fluid then dip each component in fresh brake fluid and reassemble in reverse order; making sure that the lips of the seats face into the cylinder. When completed, wipe clean the outer surfaces of the dust excluders.
13 Clean the backplate and refit the wheel cylinder using a reversal of the removal procedure. Refer to Section 8 when refitting the drum.
14 Make sure that the brake hose clamp or polythene sheeting is removed then bleed the hydraulic system, as described in Section 4.

15 Rear brake drum – inspection

1 Whenever the brake drum is removed to check the linings, take the opportunity to inspect the interior of the drum.
2 If the drum is grooved, owing to failure to renew worn linings or after a very high mileage has been covered, then it may be possible to regrind it, provided the maximum internal diameter is not exceeded (photo).
3 Even if only one drum is in need of grinding both drums must be reground to the same size in order to maintain even braking characteristics.
4 Judder or a springy pedal felt when the brakes are applied can be caused by a distorted (out-of-round) drum. Here again it may be possible to regrind the drums, otherwise a new drum will be required.



15.2 Internal surface of brake drum in good condition

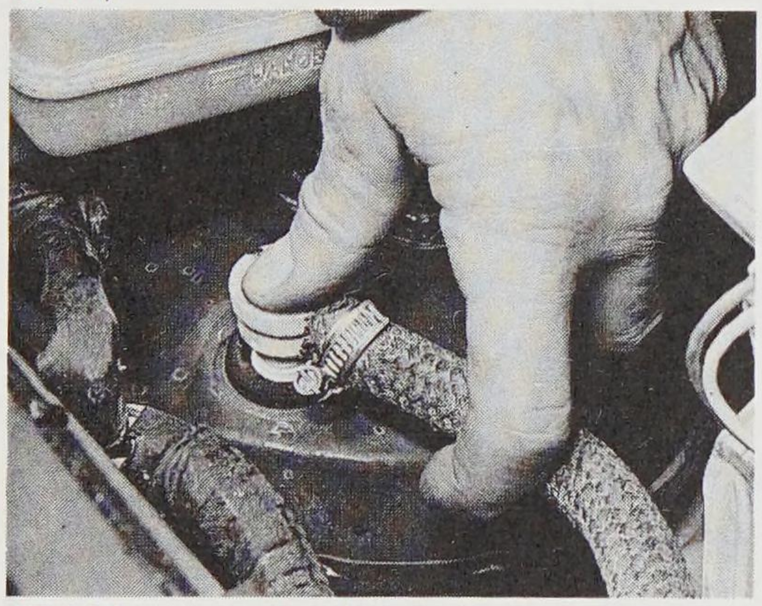
16 Master cylinder – removal and refitting

Note: *The following procedure is only applicable to vehicles without ABS. For ABS equipped models, refer to the warning note in Section 26.*

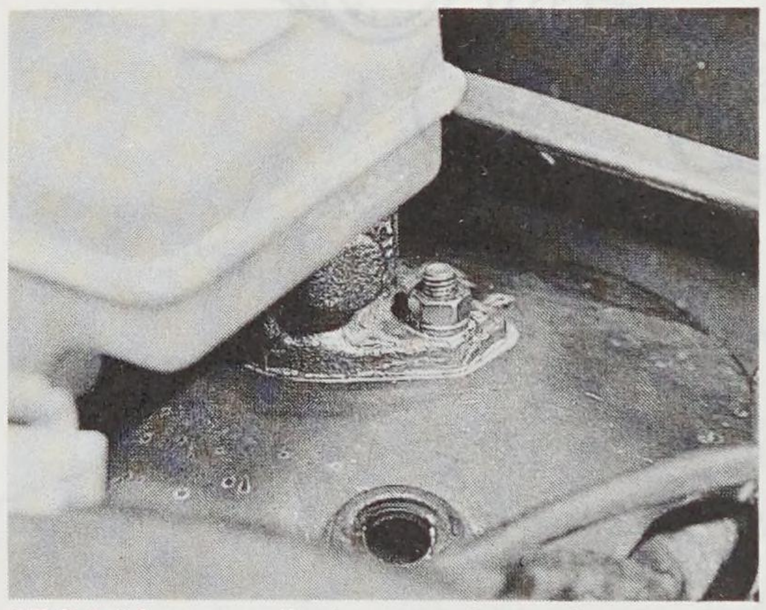
1 Remove the reservoir cap, place a piece of polythene sheet over the filler neck and refit the cap tightly. This will minimise fluid loss during removal.
2 Remove the windscreen wipers (Chapter 12).
3 Remove the air intake grille from in front of the windscreen (Chapter 11).
4 Disconnect the low brake fluid warning lamp switch.
5 Unscrew and remove the two nuts securing the master cylinder to the vacuum servo unit.
6 Spread some cloth over the vacuum servo underneath the master cylinder to catch fluid drips.
7 Undo the brake pipeline unions on the master cylinder and lift off the master cylinder and reservoir, holding the cloth under the unit to catch any spillage.
8 Undo the clamp bolt and remove the reservoir from the cylinder.
9 Refitting is a reversal of removal.
10 On completion, bleed the complete brake system as described in Section 4.

17 Vacuum servo unit – removal and refitting

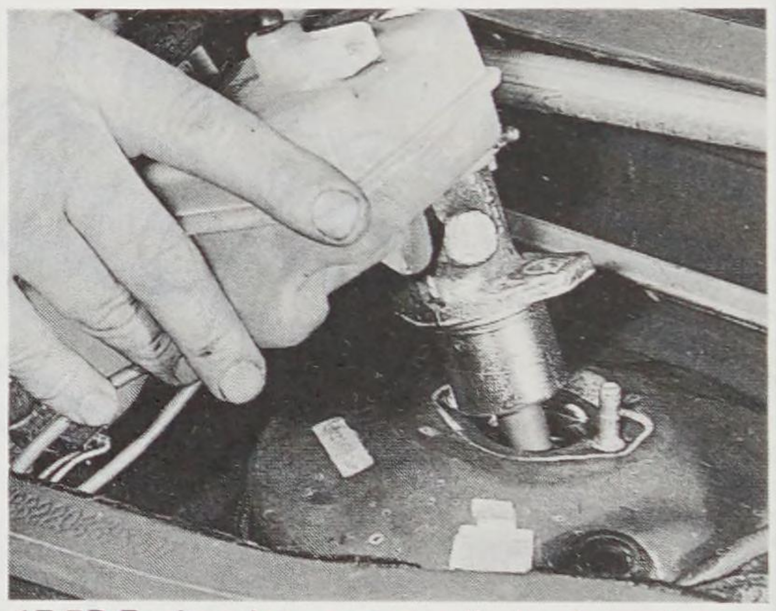
1 Remove the windscreen wipers (Chapter 12).
2 Remove the cowling from in front of the windscreen.
3 Disconnect the low brake fluid warning lamp connector on the brake fluid reservoir.
4 Disconnect the vacuum hose at the servo (photo).
5 Undo the nuts securing the master cylinder to the servo unit and ease the master cylinder up to disengage it from the servo, without disconnecting the hydraulic pipelines (photos).
6 Refer to Chapter 5 and disconnect the clutch cable (where applicable).
7 Disconnect the brake stop-lamp switch (Section 24).
8 Remove the clutch and brake pedal rubber covers.
9 Undo and remove the four nuts securing the vacuum servo to the scuttle (photo).
10 Manoeuvre the complete vacuum servo, pedal bracket and pedal assembly from the scuttle (photo).
11 Undo the four nuts securing the servo to the pedal bracket and separate the two (photo).
12 The servo unit is sealed and cannot be overhauled. If it is defective, it must be renewed.



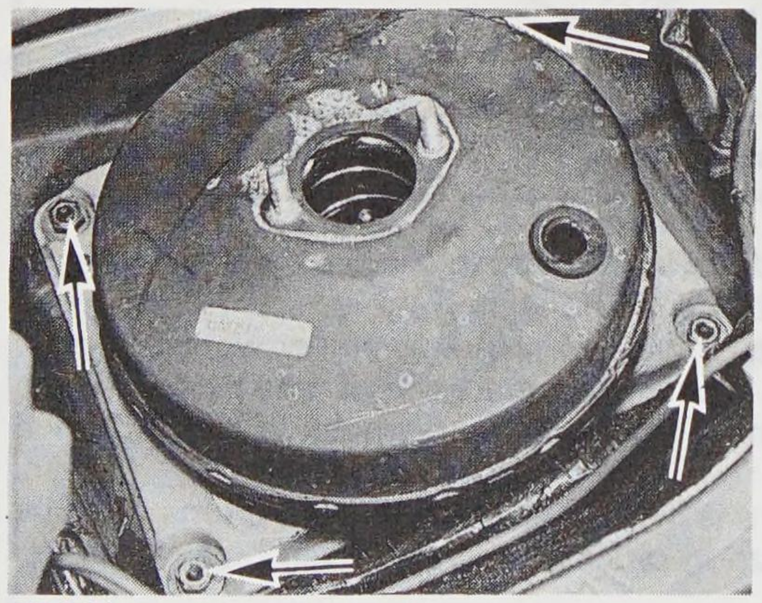
17.4 Disconnecting the vacuum servo hose



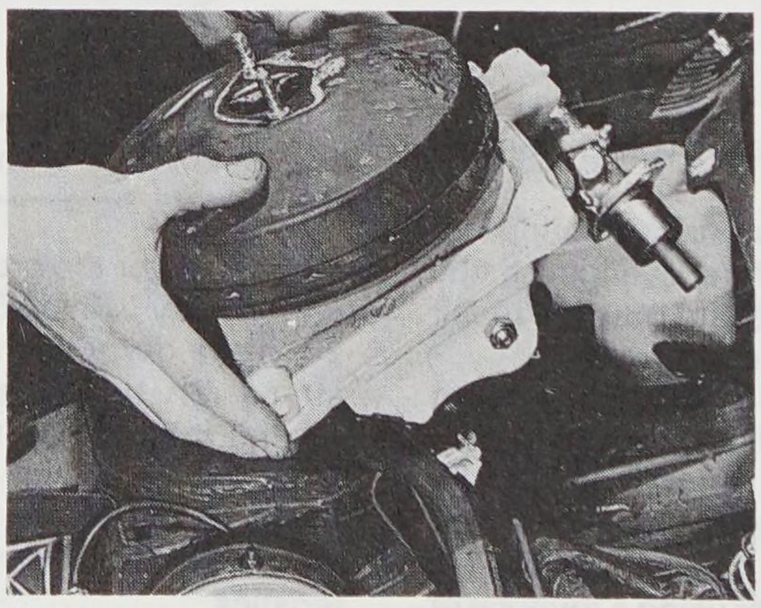
17.5A Master cylinder securing unit



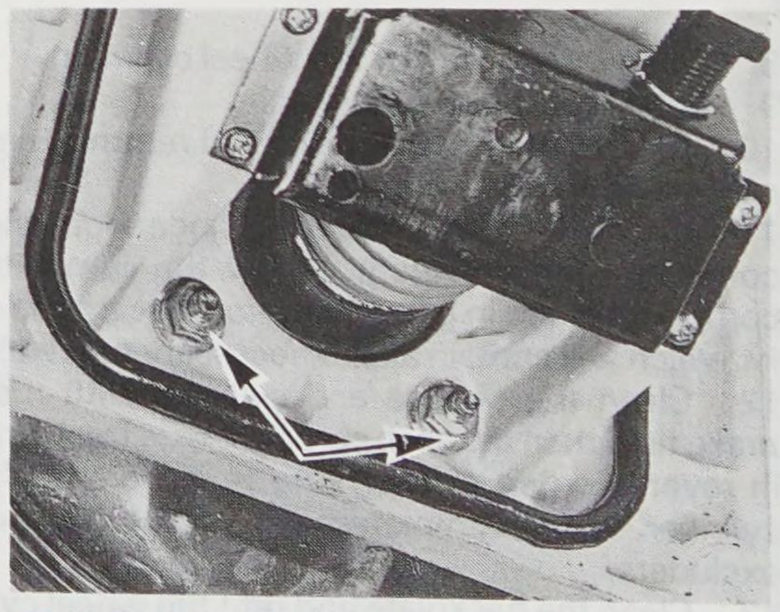
17.5B Easing the master cylinder from the vacuum servo



17.9 Vacuum servo retaining nuts (arrowed)



17.10 Lifting out the servo and pedal assembly



17.11 Pedal bracket securing nuts (arrowed)

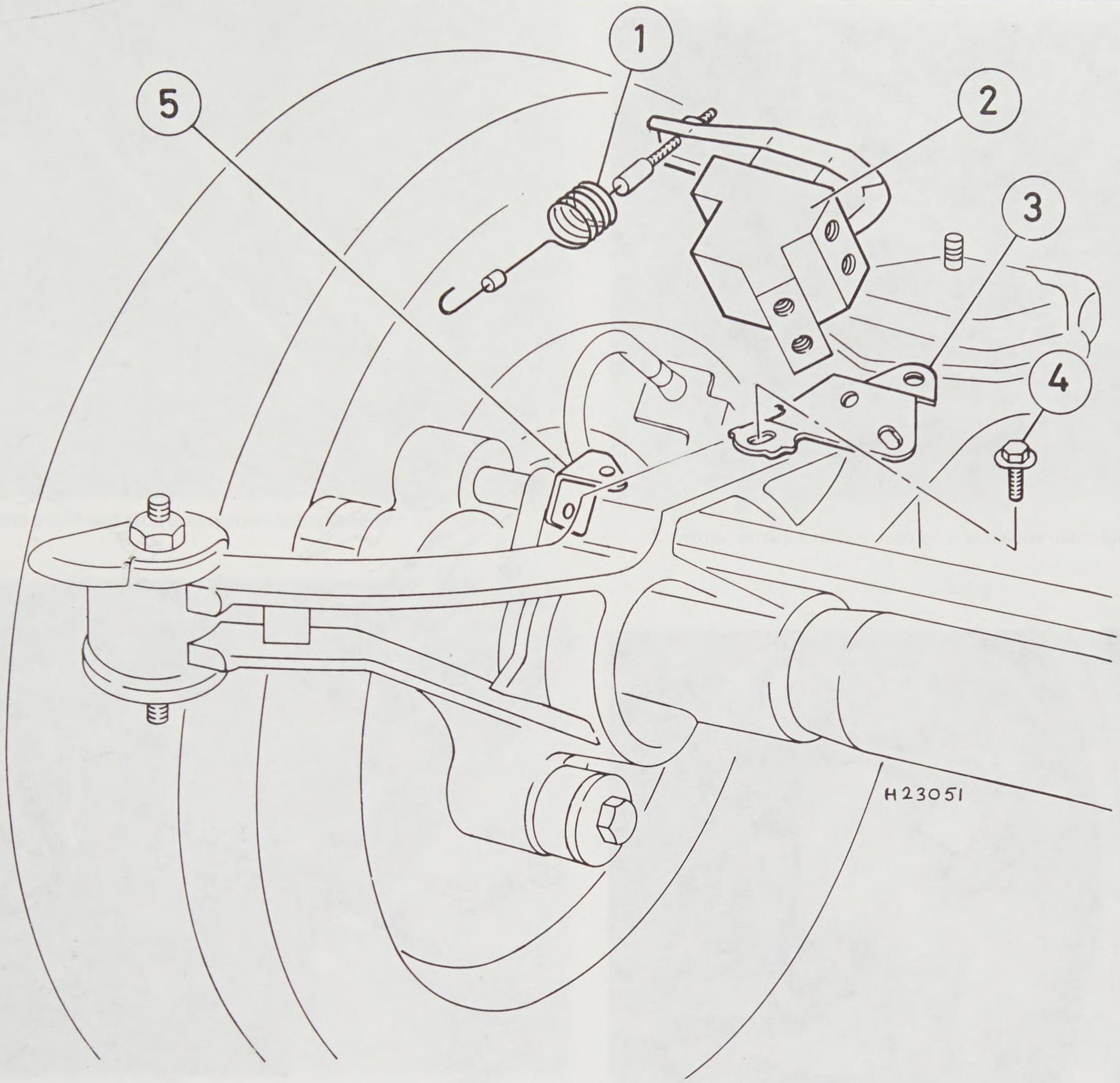


Fig 8.9 Rear brake pressure regulator valve (Sec 18)

1 *Spring and adjuster*
2 *Valve block*
3 *Mounting bracket*
4 *Mounting bolt*
5 *Spring bracket*

13 Refitting is a reversal of removal.
14 On completion adjust the brake stop-lamp switch (Section 24) and check and adjust clutch pedal height (Chapter 5), where applicable.

18 Brake pressure regulator valve – removal and refitting

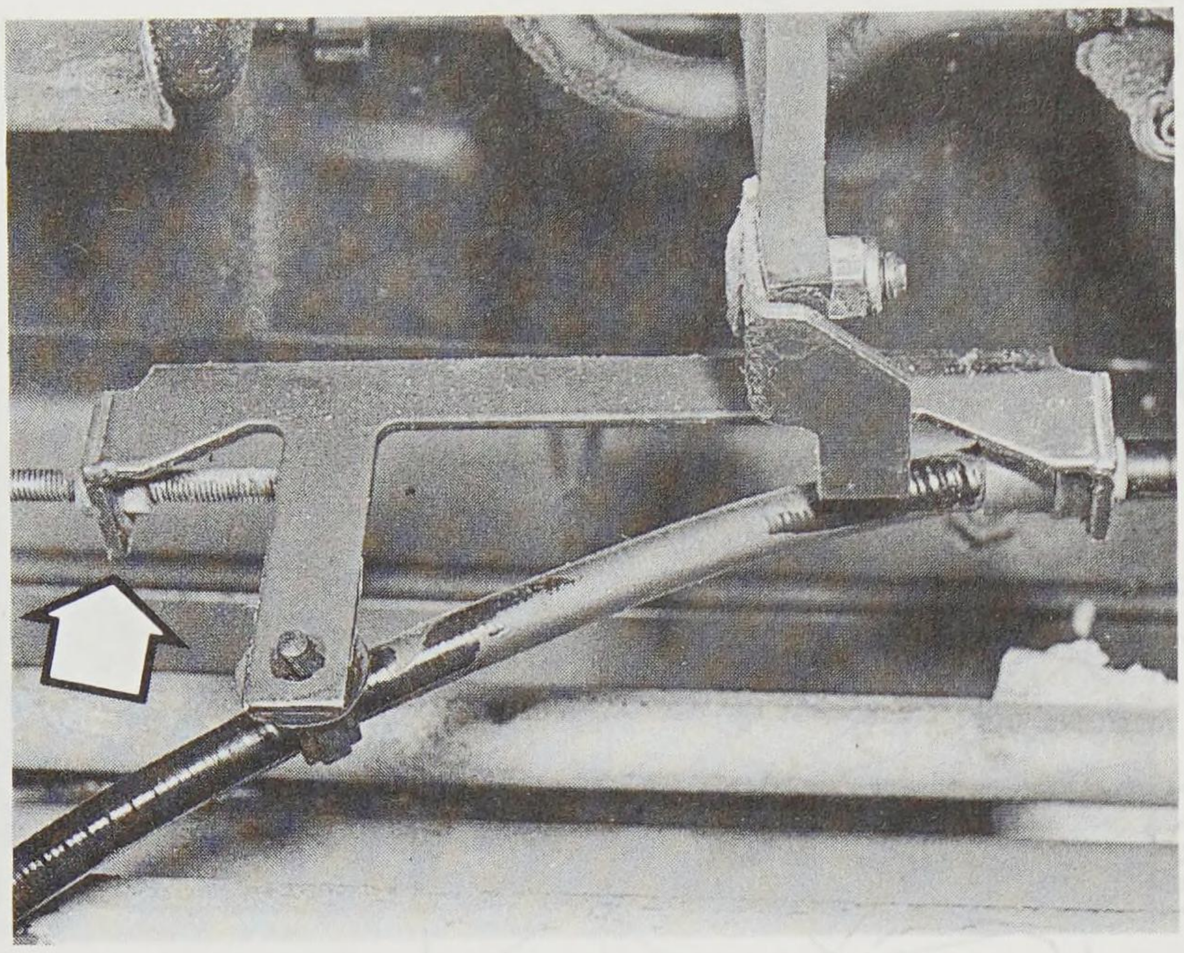
1 Removal of the valve is straightforward with reference to Fig. 8.9, but is not recommended as the test equipment needed to re-set and adjust the valve after refitting, is only available through Peugeot dealers.
2 Similarly, tampering with the spring tension adjuster can alter the valve setting and adversely affect braking and handling efficiency.

19 Handbrake – adjustment

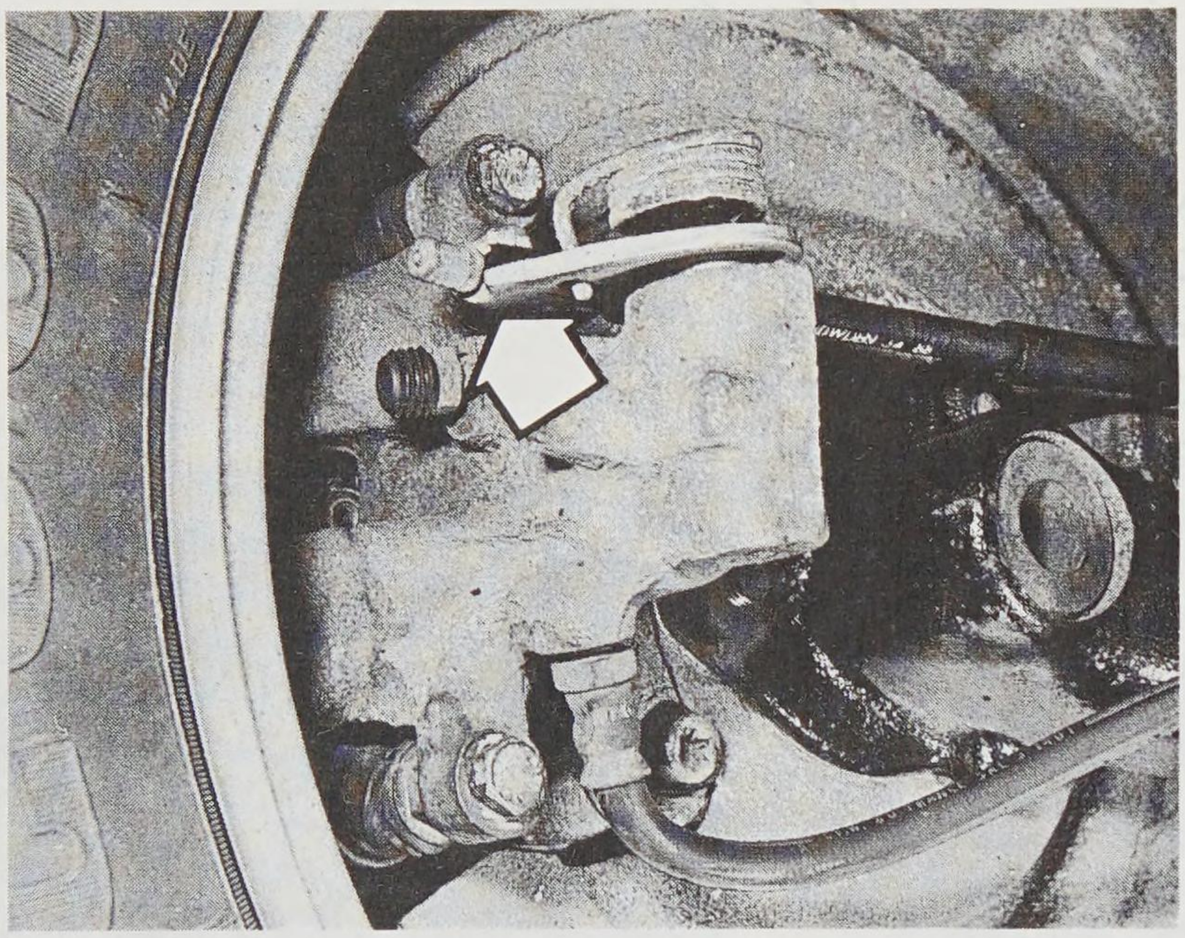
1 The handbrake is correctly adjusted when the rear wheels are fully locked by the brakes after the handbrake lever has been pulled up by six to eight notches. This adjustment tolerance will be maintained if the automatic adjuster mechanism is operating correctly and so compensates for brake shoe/pad wear.
2 To check the adjustment, release the handbrake and depress the brake pedal fully, two or three times with the engine running, to ensure full operation of the automatic adjusters.
3 Chock the front wheels and raise the rear of the vehicle onto axle stands. Apply the handbrake to between six to eight notches and check that both rear wheels are locked. If this is not the case, or if the wheels lock before the handbrake lever has moved through at least six notches, adjust the cable as follows.

Rear drum brakes

4 With the car raised and supported at the rear, remove the underfloor tray, where fitted.
5 Pull up the handbrake lever to the sixth notch of the ratchet.
6 Slacken the locknut on the handbrake equaliser mechanism and turn the adjuster nut until the brake shoes are just beginning to bind on the drums (photo).
7 Tighten the locknut and release the handbrake. Check that the wheels are free to turn with the handbrake released and are locked with the lever pulled up by six to eight notches.



19.6 Handbrake cable equaliser mechanism with adjuster (arrowed)



19.11 Brake cable end stop-to-lever clearance (arrowed) on rear disc brakes

8 Where applicable, refit the underfloor tray then lower the vehicle to the ground.

Rear disc brakes

9 Where fitted, remove the underfloor tray then lower the vehicle to the ground, as the adjustment procedure for rear disc brake models is carried out with the vehicle standing on its wheels.

10 Chock the front wheels and release the handbrake.

11 Slacken the locknut on the handbrake equaliser mechanism then turn the adjuster nut until there is a clearance of approximately 2.0 mm (0.078 in) between the handbrake cable end stops and the operating levers on the rear callipers (photo).

12 Operate both levers manually and check that they return to their normal position when released.

13 Tighten the adjuster nut at the equaliser mechanism until the distance from the rear face of the nut to the end of the cable is approximately 15.0 mm (0.59 in).

14 Check that the handbrake lever moves through six to eight notches from fully off to fully applied. If this is not the case re-adjust the cable at the adjuster nut.

15 On completion, tighten the adjuster locknut and, where applicable, refit the underfloor tray.

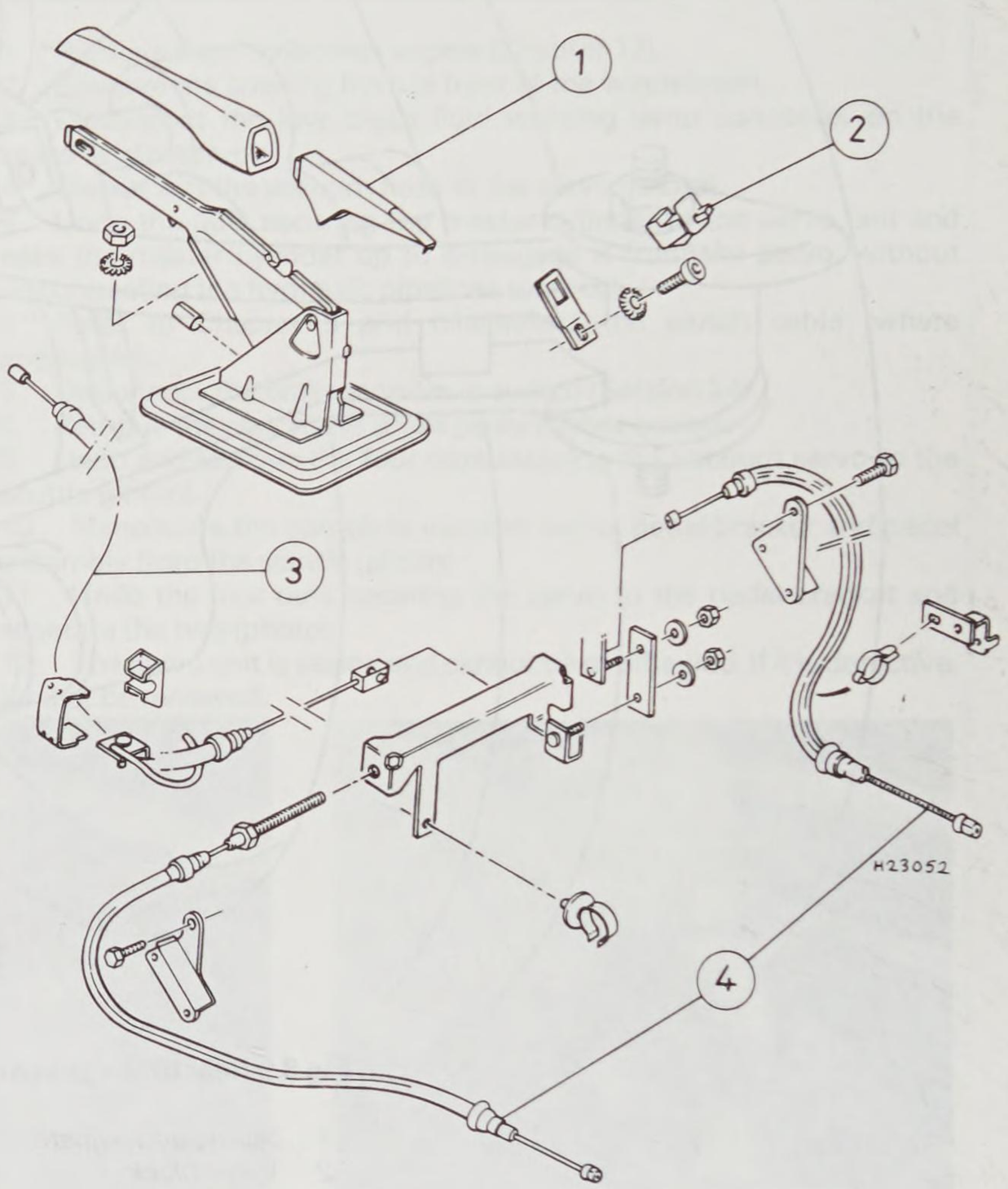


Fig 8.10 Handbrake lever and cables assembly (Sec 20)

1 Handbrake lever
2 Switch assembly
3 Primary cable
4 Secondary cables

20 Handbrake cables – renewal

Primary cable

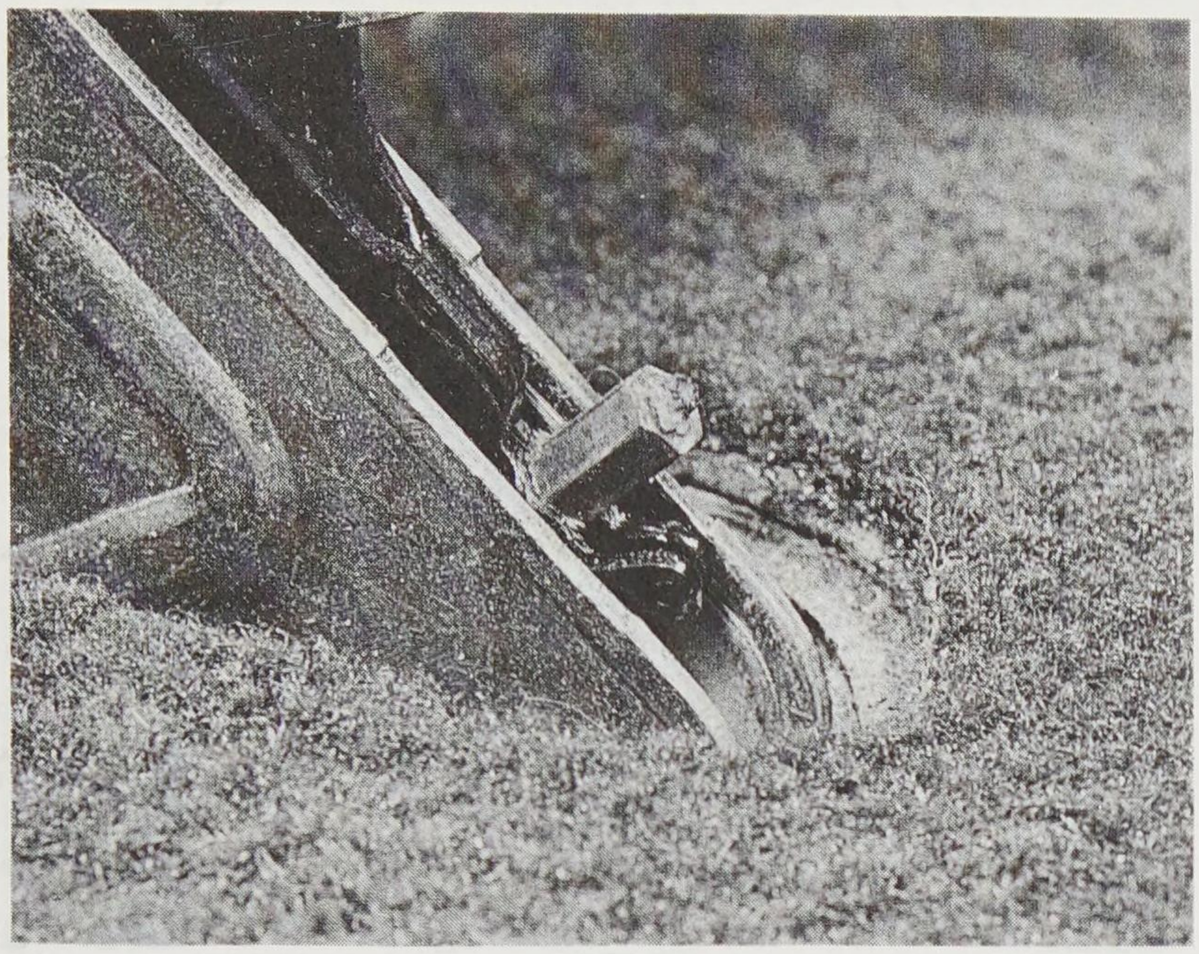
1 Raise the vehicle onto axle stands.

2 If fitted, remove the rear underfloor tray.

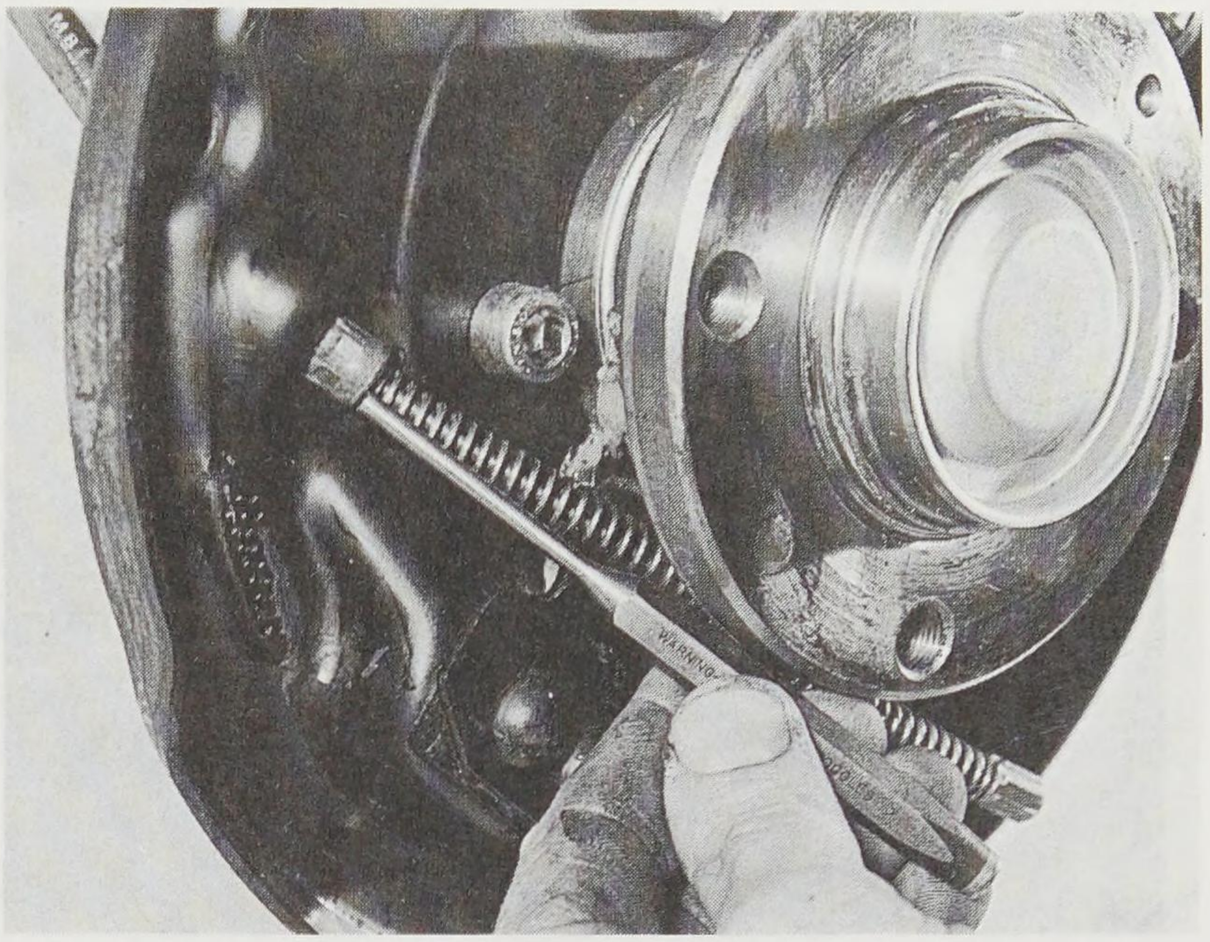
3 Release the handbrake then undo the locknut and adjuster nut on the equaliser mechanism.

4 Unbolt and remove the exhaust heat shield.

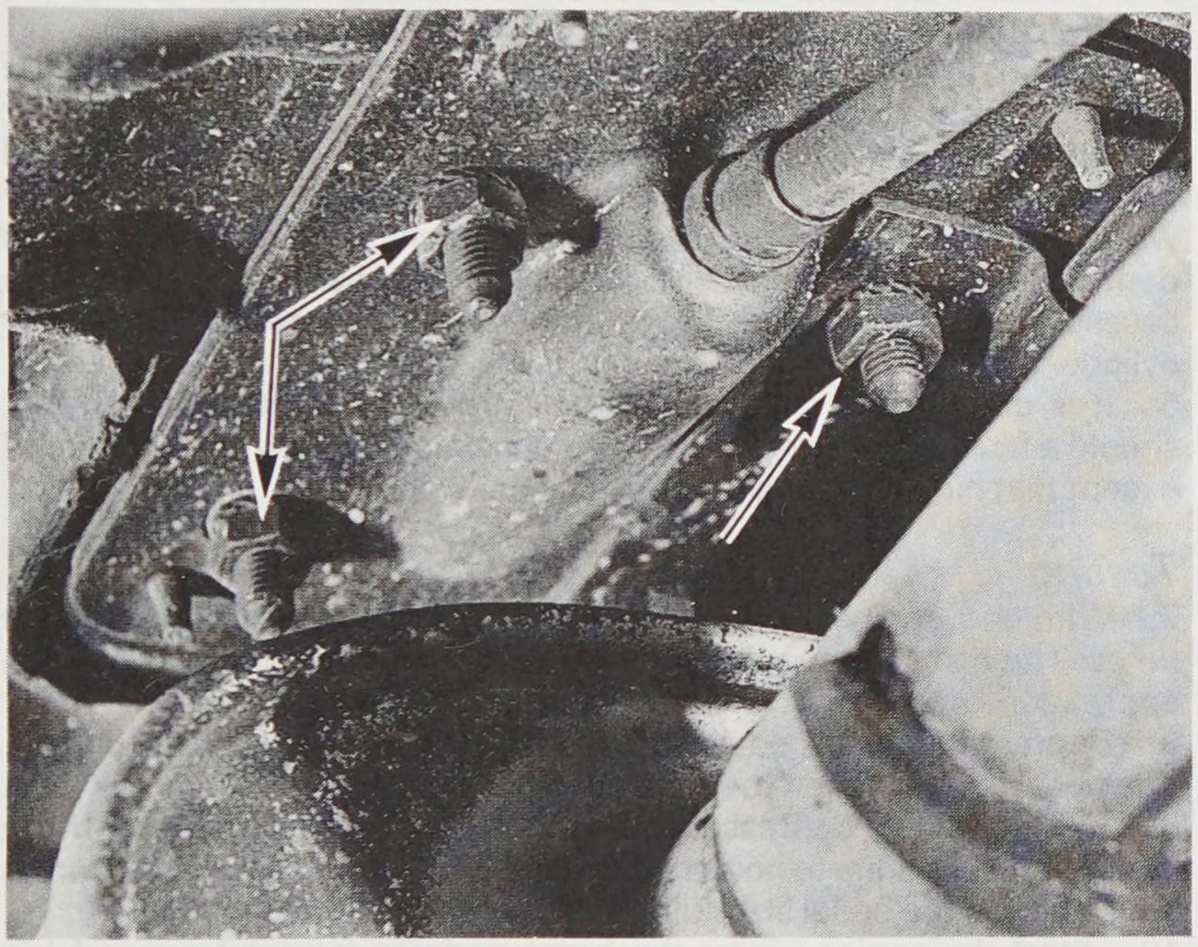
5 Release the primary cable from its clips on the underbody, then release it from the right-hand secondary cable at the connector, and from the equaliser bracket.



20.9 Brake cable end stop connection to brake lever



20.16 Knocking the brake outer cable from the brake backplate



21.2 Handbrake cover-to-floorpan securing nuts (arrowed)

6 Release the outer cable sheath from the tunnel under the handbrake lever.
7 Inside the vehicle, remove the centre floor console (Chapter 11).
8 Pull the handbrake lever up by five notches.
9 Pull the end of the cable into the vehicle then release it from the handbrake lever (photo).
10 Withdraw the cable from under the vehicle.
11 Refit in reverse order and adjust the handbrake as described in Section 19.

Secondary cables

12 Chock the front wheels, raise the rear of the vehicle onto axle stands and release the handbrake.
13 Remove the underfloor tray where fitted then detach the cables from the equaliser mechanism (left-hand cable), or cable connector (right-hand cable) and the clips on the trailing arms.
14 Where rear disc brakes are fitted, release the cables from the brake operating lever on the rear calliper and withdraw the cable.
15 Where rear drum brakes are fitted, remove the rear drum as described in Section 8.
16 Disconnect the cable from the brake operating lever and withdraw the cable. If it is tight, knock the outer cable from the backplate with a drift (photo).
17 Refitting is a reversal of removal, adjusting the handbrake as described in Section 19.

21 Handbrake lever – removal and refitting

1 Disconnect the handbrake primary cable from the handbrake lever as described in Section 20.
2 From underneath the vehicle, remove the four nuts securing the handbrake support panel to the floorpan (photo).
3 Remove the centre floor console as described in Chapter 11.
4 Disconnect the handbrake on warning lamp switch as described in Section 22.
5 Lift out the handbrake and floor panel. If the panel is stuck to the floorpan with sealant, cut round it with a sharp knife to free it.
6 Refitting is a reversal of removal using a new gasket and/or sealant on the floor panel.
7 On completion check and adjust the handbrake as described in Section 19.

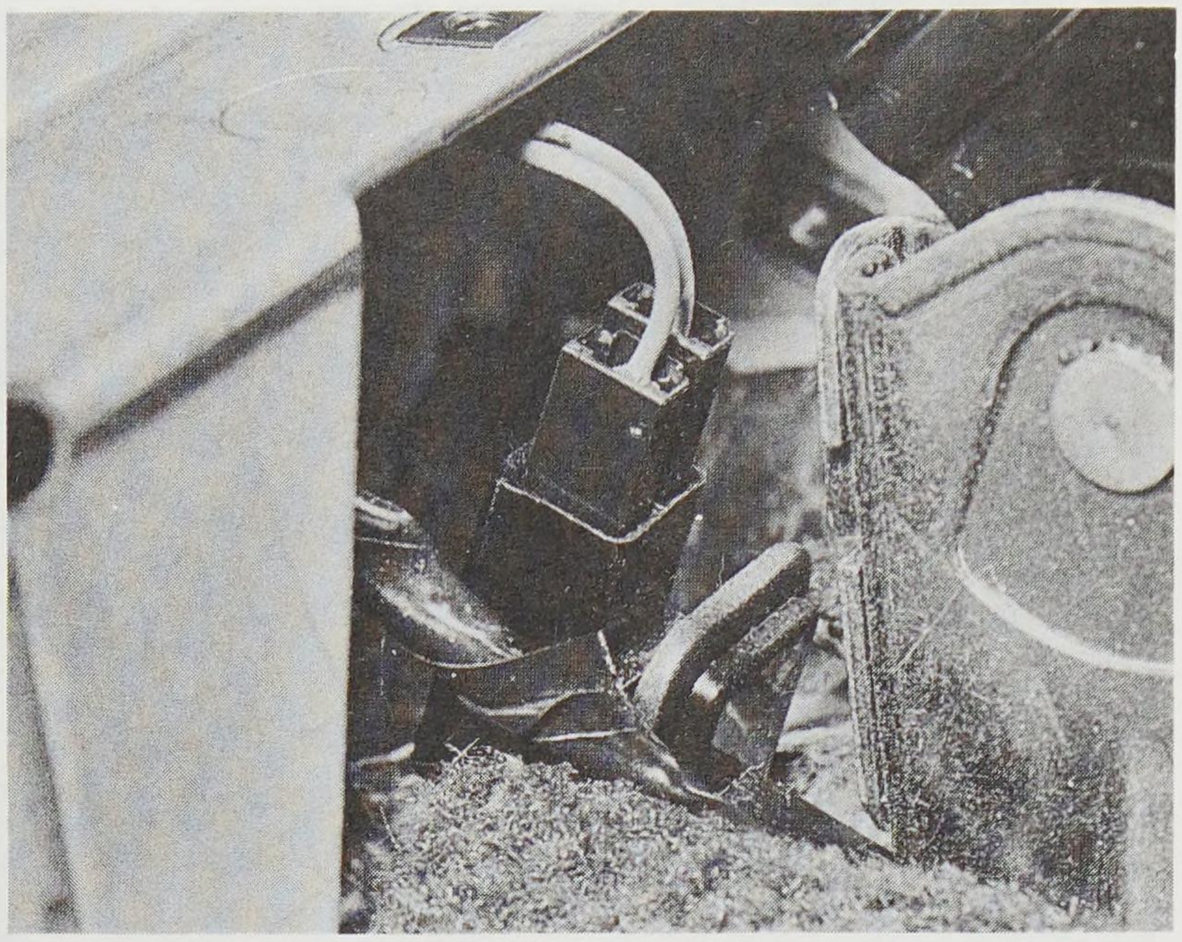
22 Handbrake 'on' warning lamp switch – removal and refitting

1 Remove the centre floor console as described in Chapter 11.
2 Disconnect the leads to the switch (photo).
3 Unbolt the switch bracket and withdraw the switch and bracket.
4 Refit in reverse order, adjusting the bracket so that the warning lamp is off with the handbrake released and on with the handbrake applied.

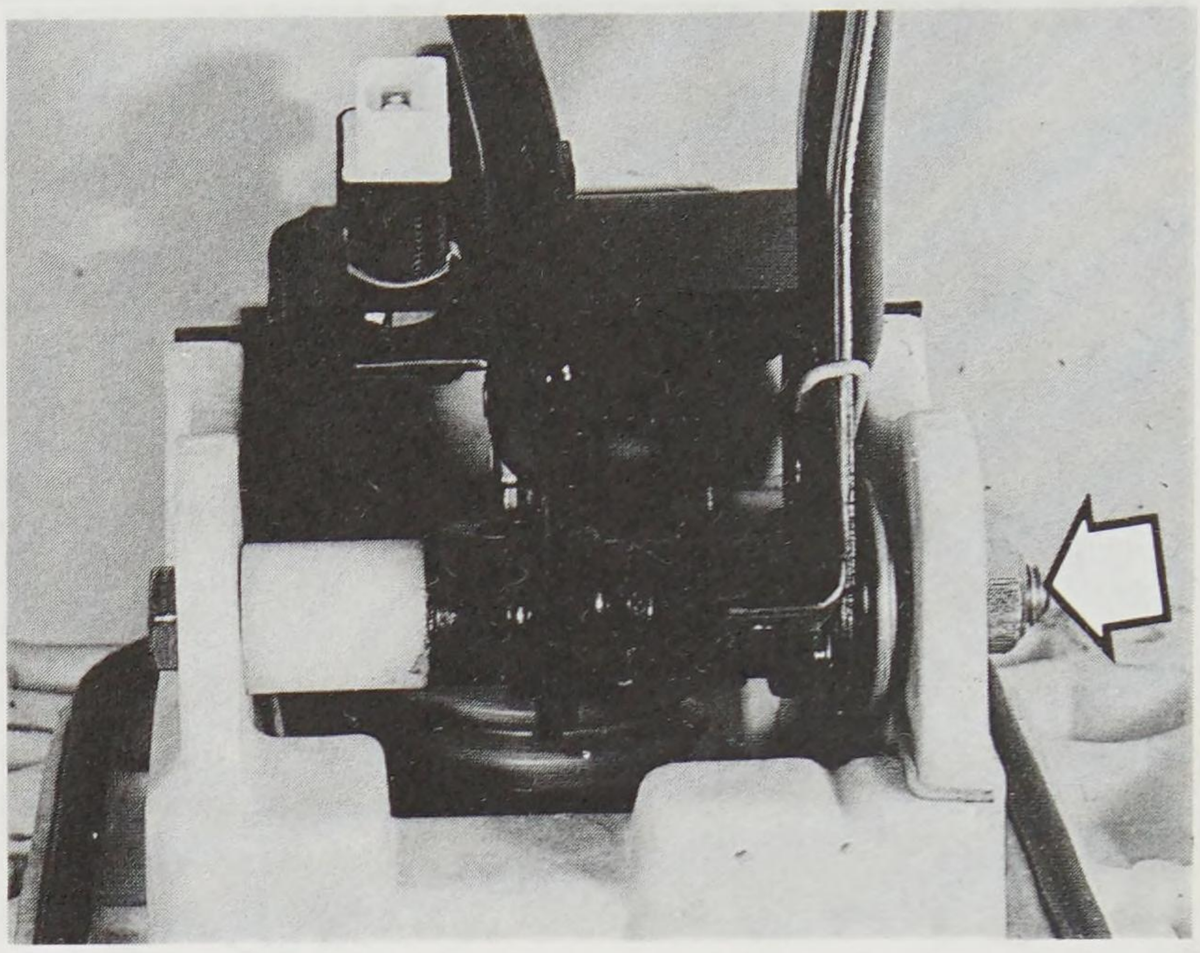
23 Brake and clutch pedals – removal and refitting

Note: *The following procedure is only applicable to vehicles without ABS. On models with ABS it is necessary to remove the brake hydraulic modulator unit, which can only be carried out by a suitably equipped Peugeot dealer, for access to the pedal assembly.*

1 Removal of the pedals from the vehicle is covered in Section 17.
2 To remove the pedals from the pedal bracket undo the nut from the pedal pivot bolt and withdraw the pivot bolt to release the pedals (photo).
3 Renew the nylon bushes if they are worn or perished.
4 Refit the pedals to the pedal bracket in reverse order using a little grease on the pivot bolt.
5 Refit the assembly as described in Section 17.
6 Adjust the clutch pedal travel as described in Chapter 5.
7 Adjust the brake stop-lamp switch as described in Section 24.



22.2 Handbrake 'on' warning lamp lead



23.2 Brake pedal pivot bolt and nut (arrowed)

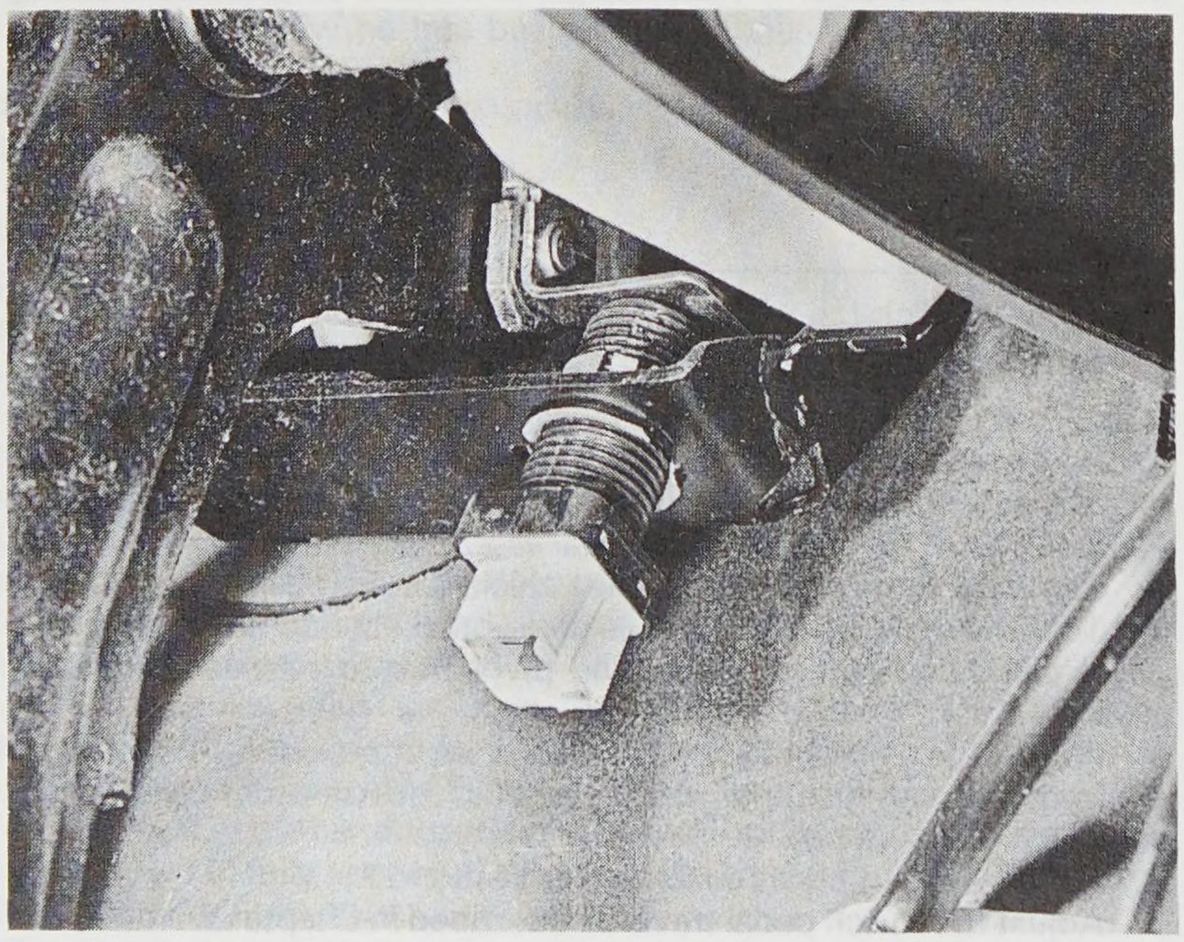
24 Brake stop-lamp switch – removal, refitting and adjusting

1 The switch is mounted on the brake pedal bracket.
2 To remove the switch, disconnect the lead and pull the switch from the bracket (photo).
3 To refit and adjust the switch, depress the brake pedal and push the switch all the way into its holder in the bracket.
4 Release the pedal against the switch when the switch should retract and automatically reset itself.
5 Reconnect the lead and switch on the ignition before checking the operation of the stop-lamps.
6 If the stop-lamps fail to work, renew the switch.

25 Vacuum servo unit – description, testing and maintenance

Description

1 A vacuum servo unit is fitted to all vehicles not equipped with ABS and is located between the brake pedal and the master cylinder. The unit provides power assistance to the driver when the brake pedal is depressed.
2 The unit operates by vacuum obtained from the engine induction manifold and consists of, basically, a booster diaphragm and non-return valve.



24.2 Brake stop-lamp switch assembly

3 The servo unit and the master cylinder are connected so that the servo piston rod acts as the master cylinder pushrod.
4 The driver's braking effort is transmitted from the brake pedal to the servo unit piston and its integral control system.
5 The forward chamber of the servo unit is held under vacuum at all times whilst the rear chamber is held under vacuum conditions only when the brake pedal is in the released position. When the pedal is depressed, the rear chamber opens to atmospheric pressure which causes the servo piston to move forward and so operate the master cylinder pushrod.
6 It is emphasised that a servo unit provides assistance only and, should a fault occur, the normal hydraulic braking system is unaffected except that higher pedal pressure will be needed.

Testing

7 With the engine switched off, depress the brake pedal several times. The distance by which the pedal moves should alter with each application.
8 Depress the brake pedal fully and hold it down then start the engine. The pedal should be felt to move downward slightly.
9 Hold the pedal depressed with the engine running, switch off the ignition and continue to hold the pedal depressed for 30 seconds during which period the pedal should neither rise nor drop.
10 Start the engine whilst the brake pedal is released, run it for a minute and switch off. Give several applications of the brake pedal. The pedal travel should decrease with each application.
11 Failure of the brake pedal to act in the way described will indicate a fault in the servo unit.
12 The servo unit should not be serviced or overhauled beyond the operations described in this Section and in the event of a fault developing, renew the servo complete.
13 Periodically check the condition of the vacuum hose and security of the clips.
14 Renew the hose if necessary.
15 If the servo hose right-angled non-return valve is loose in its sealing grommet, or if the grommet shows evidence of cracking or perishing, renew it. Apply some hydraulic fluid to the rubber to facilitate fitting.

26 Anti-lock braking system (ABS) – description and precautions

The Bendix anti-lock braking system is fitted to Mi 16 models as standard equipment and is available as an option on all other fuel injected models.

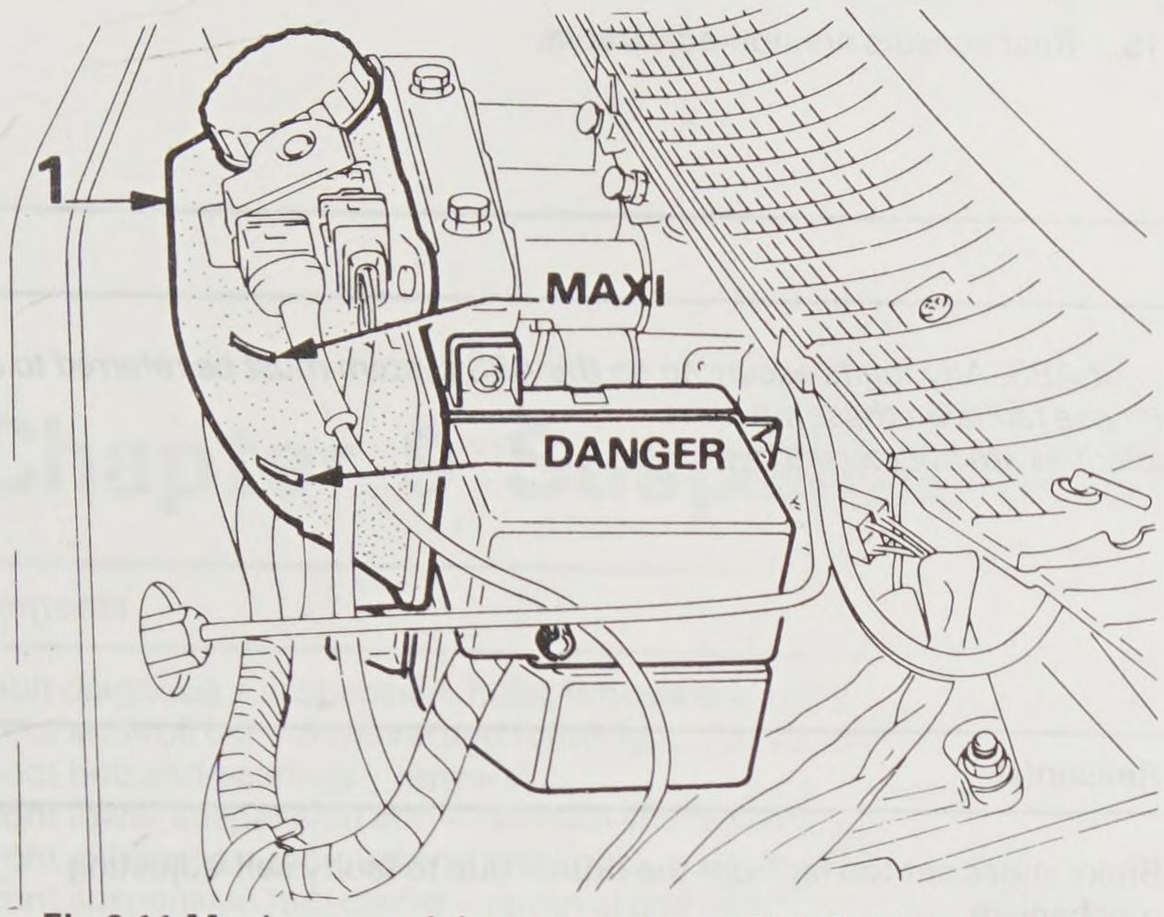


Fig 8.11 Maximum and danger marks on ABS fluid reservoir (1) (Sec 28)

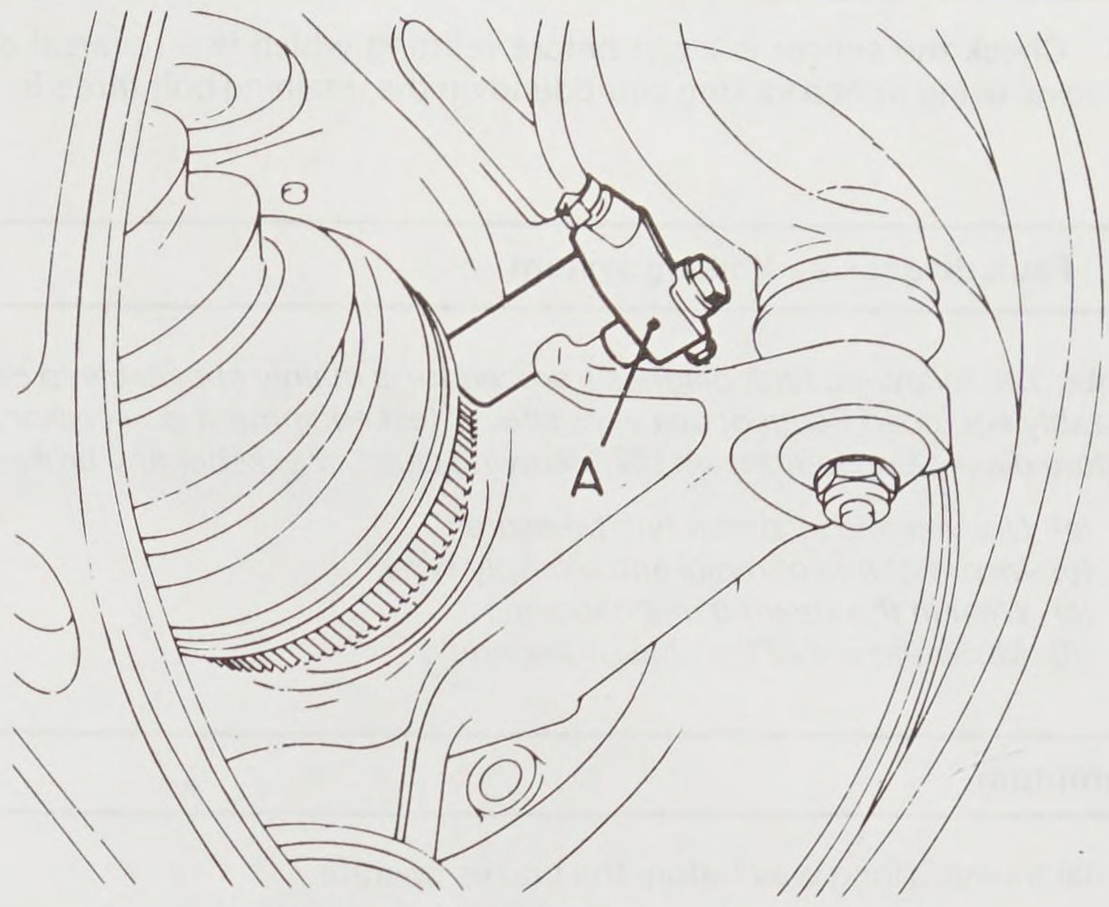


Fig 8.12 ABS front wheel sensor A (Sec 29)

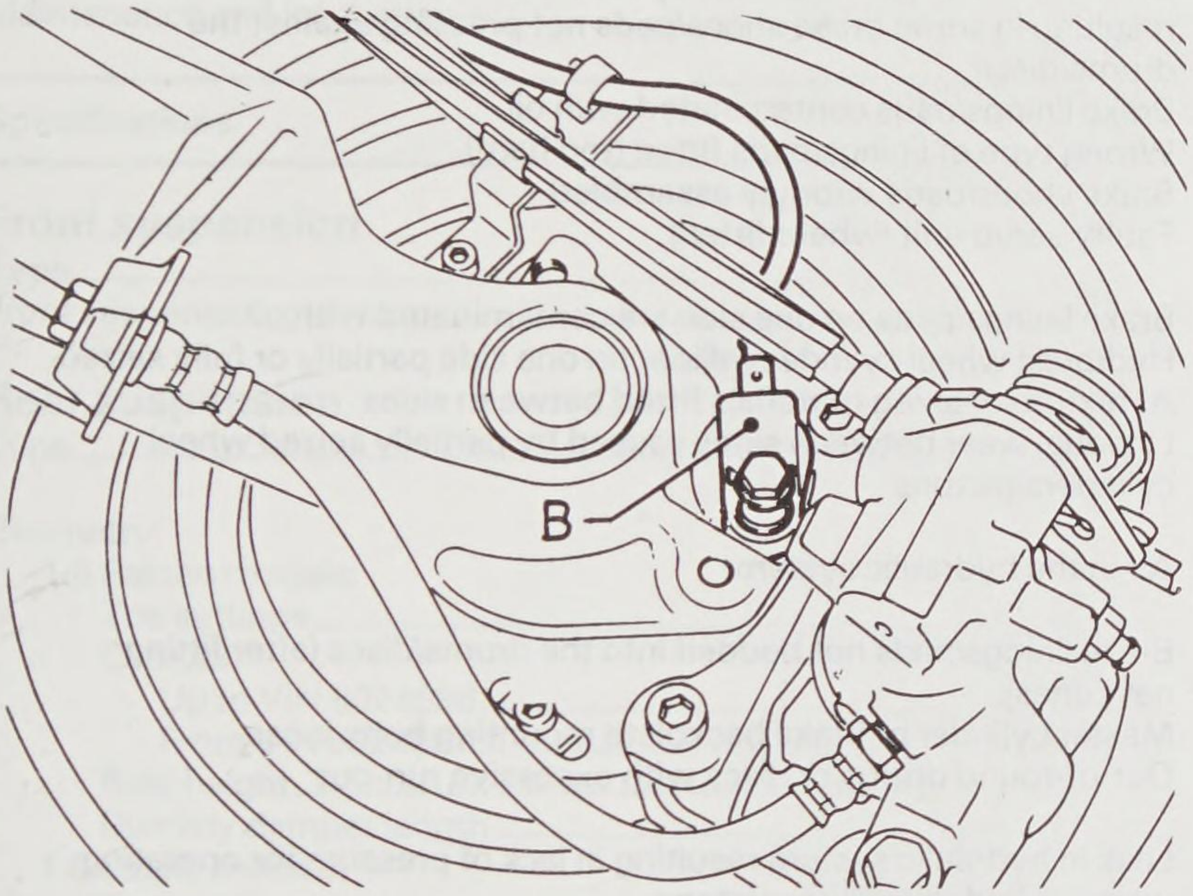


Fig 8.13 ABS rear wheel sensor B (Sec 29)

The system operates at very high fluid pressure typically 158 to 183 bar (2300 to 2700 lbf/in^2) generated by an electric pump. Sensors mounted at each wheel monitor the rotational speed of the wheel in relation to each other wheel and if any one wheel should slow down, indicating a wheel-lock condition, the control unit will limit the pressure accordingly. In this way stopping ability in adverse conditions, stability and directional control are greatly enhanced.

The system is fail-safe and will continue to operate even if one wheel sensor should fail. In the event of total failure, the control unit will revert the system to normal braking. Should failure occur, a self-monitoring test facility is incorporated in the system which can be used in conjunction with dealer test equipment to determine the nature of the fault.

The brake unit, reservoir, electronic control unit and fuse and relay box are all mounted in the scuttle under the air intake grille. The accumulator and electric pump are mounted in the engine compartment on the right-hand side inner wing panel. The brake warning lamp relay is mounted behind and above the main fusebox inside the vehicle.

Warning: *Due to the complexity of the system, the very high fluid pressures involved and the need for special bleeding equipment and pressure gauges, any operation requiring removal or disconnection of any hydraulic component, pipe or fitting must only be carried out by a suitably equipped Peugeot dealer. Failure to heed this warning may result in personal injury or malfunction of the system at a critical time. Work on ABS equipped vehicles should therefore be confined to routine maintenance operations or those that do not entail disconnection of any hydraulic components.*

27 ABS – fluid level checking

Important – *in some instances the fluid level can rise above the maximum mark on the reservoir.*

1 To check the level, proceed as follows.
2 Switch off the ignition.
3 Depress the brake pedal at least twenty times, switch the ignition on and wait for the electric pump to stop running.
4 Check the fluid level, which should be between the maximum and danger marks on the side of the reservoir.
5 Top up with the specified hydraulic fluid as necessary. A small drop in level over a period is normal, a large fluid loss should be investigated immediately.
6 Switch off the ignition.

28 ABS wheel sensors – removal, refitting and adjusting

Front wheel sensor

1 Disconnect the right-hand sensor at the connector behind the electric pump unit.
2 Disconnect the left-hand sensor at the connector under the battery tray.
3 Undo the sensor retaining bolt and withdraw the sensor from the hub carrier.
4 Release the sensor cables from the cable ties and feed the cable through the grommet in the inner wing panel.
5 Before refitting a sensor, ensure the sensor tip is clean. On new sensors, remove the adhesive sticker from the tip.
6 Check the sensor slides freely in the bracket.
7 Fit the sensor and bracket assembly to the hub carrier and apply thread locking compound to the retaining bolt before fitting and tightening the bolt to the specified torque.
8 Loosen the adjuster bolt.
9 Position a 0.5 mm (0.02 in) feeler blade between the sensor tip and the sensor ring on the driveshaft.
10 Press the sensor lightly against the feeler blade and tighten the adjuster bolt to the specified torque. Remove the feeler blade.

Rear sensors

11 Disconnect the left-hand sensor connector behind the panel in the left-hand side boot space trim, or the right-hand sensor connector behind the right-hand side.
12 Release the cables from the cable clips on the rear chassis members and trailing arms and feed the cable through the floor panel.
13 Unbolt the sensors from the trailing arms and remove the assemblies.

14 Check the sensor is clean before refitting which is a reversal of removal using thread locking compound on the retaining bolt threads.

15 Rear sensors are non-adjustable.

29 Fault diagnosis – braking system

Note: *The following fault diagnosis procedure is mainly applicable to cars without ABS. Any faults occurring on the ABS system must be referred to a suitably equipped Peugeot dealer as special test equipment is necessary to diagnose faults on these systems.*
Before diagnosing faults from the following chart, check that any braking irregularities are not caused by:

(a) Uneven and incorrect tyre pressures
(b) Incorrect mix of radial and crossply tyres
(c) Wear in the steering mechanism
(d) Misalignment of the chassis geometry

Symptom	Reason(s)
Pedal travels a long way before the brakes operate	Brake shoes set too far from the drums due to faulty self-adjusting mechanism
Stopping ability poor, even though pedal pressure is firm	Linings/pads and/or drums/disc badly worn or scored One or more wheel hydraulic cylinders or calliper pistons seized resulting in some brake shoes/pads not pressing against the drums/discs Brake linings/pads contaminated with oil Wrong type of linings/pads fitted (too hard) Brake shoes/pads wrongly assembled Faulty servo unit (where fitted)
Car veers to one side when the brakes are applied	Brake linings/pads on one side are contaminated with oil Hydraulic wheel cylinder/calliper on one side partially or fully seized A mixture of lining materials fitted between sides Unequal wear between sides caused by partially seized wheel cylinders/pistons
Pedal feels spongy	Air in the hydraulic system
Pedal feels springy when the brakes are applied	Brake linings/pads not bedded into the drums/discs (after fitting new ones) Master cylinder or brake backplate mounting bolts loose Out-of-round drums or discs with excessive run-out
Pedal travels right down with little or no resistance and brakes are virtually non-operative	Leak in hydraulic system resulting in lack of pressure for operating wheel cylinders/calliper pistons If no signs of leakage are apparent the master cylinder internal seals are failing to sustain pressure
Binding, juddering, overheating	One or a combination of causes given in the foregoing sections Handbrake over-adjusted Handbrake cable(s) seized
Lack of servo assistance	Vacuum hose leaking Non-return valve defective or leaking grommet Servo internal fault

Chapter 9 Suspension, hubs, wheels and tyres

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Specifications

Front suspension

Type	Independent, MacPherson struts, coil springs and anti-roll bar
Front suspension geometry	Refer to Chapter 10

Rear suspension

Type	Independent, transverse torque tube with trailing arms, torsion bars, inclined shock absorbers and anti-roll bar
Geometry:	
1.6 Saloon models:	
Toe settings	0.5 ± 1.0 mm toe-out
Camber:	
Up to VIN 8024596	–0° 30′ ± 30′
From VIN 8024597	–1° 20′ ± 30′
Ride height	205.0 ± 7.0 mm
Dummy damper length	387.0 mm
1.6 Estate models:	
Toe setting	2.0 ± 1.0 mm toe-out
Camber:	
Up to VIN 8024596	–0° 30′ ± 30′
From VIN 8024597	–1° 20′ ± 30′
Ride height:	
With 165/70R14T tyres	225.0 ± 7.0 mm
With power steering	237.0 ± 7.0 mm
Dummy damper length	390.0 mm
1.9 Saloon (carburettor models):	
Toe setting:	
Up to VIN 8024596	1.0 ± 1.0 mm toe-in
From VIN 8024597	0.5 ± 1.0 mm toe-out
Camber:	
Up to VIN 8024596	–0° 30′ ± 30′
From VIN 8024597	–1° 20′ ± 30′
Ride height:	
Manual transmission	213.0 ± 7.0 mm
Automatic transmission	Refer to dealer
Dummy damper length:	
Manual transmission	387.0 mm
Automatic transmission	389.0 mm
1.9 Estate (carburettor models):	
Toe setting	2.0 ± 1.0 mm
Camber:	
Up to VIN 8024596	–0° 30′ ± 30′
From VIN 8024597	–1° 20′ ± 30′
Ride height	234.0 ± 7.0 mm
Dummy damper length:	
Standard	391.0 mm
Heavy duty	388.0 mm

1.9 Saloon (fuel injection models except Mi 16):	
Toe setting:	
Up to VIN 8025039	1.0 ± 1.0 mm toe-in
From VIN 8025040	0.5 ± 1.0 mm toe-out
Camber:	
Up to VIN 8025039	–0° 30′ ± 30′
From VIN 8025040	1° 20′ ± 30′
Ride height	210.0 ± 7.0 mm
Dummy damper length	Refer to dealer
1.9 Estate (fuel injection models):	
Toe setting	2.0 ± 1.0 mm toe-out
Camber:	
Up to VIN 8025039	–0° 30′ ± 30′
From VIN 8025040	1° 20′ ± 30′
Ride height	232.0 ± 7.0 mm
Dummy damper length	391.0 mm
Mi 16 models:	
Toe setting	1.5 ± 1.0 mm toe-in
Camber:	
Up to VIN 8025039	–0° 30′ ± 30′
From VIN 8025040	1° 20′ ± 30′
Ride height	180.0 mm
Dummy damper length	375.0 mm

Roadwheels

All models except 1.6 Saloon and Mi 16:	
Steel wheels	5.5J14 FH 4.25
Alloy wheels	5.5J14 CH 4.25
1.6 Saloon models:	
Steel wheels	5J14 FH 4.25
Alloy wheels	5.5J14 CH 4.25
Mi 16 models:	
Alloy wheels	6J14 CH 4.29

Tyres

1.6 GE, GL, GR models	165/70 SR 14, 175/70 T14	
1.9 GL, GR, GRi, SRi, GTX models	185/65 HR 14	
Mi 16 models	195/60 VR 14	
Tyre pressures – bar (lbf/in²)*:	**Front**	**Rear**
165/70 SR 14 and 175/70 T14 tyres	2.1 (30)	2.1 (30)
185/65 HR 14 tyres	2.0 (29)	2.1 (30)
195/60 VR 14 tyres	2.1 (30)	2.1 (30)

**For latest information, consult vehicle handbook or tyre manufacturer's recommendations*

Hub bearing grease type ..... Multi-purpose lithium-based grease (Duckhams LB 10)

Torque wrench settings

	Nm	**lbf ft**
Front suspension		
Subframe front bolts	60	44
Subframe rear bolts	90	66
Lower suspension arm rear nuts	45	33
Lower suspension arm front bolt	75	55
Anti-roll bar-to-suspension arm bolt	75	55
Anti-roll bar link rod top bolt	65	48
Balljoint-to-hub carrier	260	191
Suspension strut top mounting nuts	25	18
Suspension strut centre locknut	55	40
Front hub nut	265	195
Hub carrier clamp bolt	55	40
Lower balljoint self-locking nut	30	22
Anti-roll bar clamp bolts	25	18
Anti-roll bar locating clamp	20	15
Rear suspension		
Torsion bar thrustwasher bolts	17	12
Shock absorber mounting bolts	110	81
Anti-roll bar clamp bolts	55	40
Anti-roll bar cotter bolts	55	40
Suspension frame rear bolts	25	18
Suspension frame front nuts	55	40
Suspension frame front mounting bush bolt	60	44
Rear hub nut	275	200
Roadwheels		
Roadwheel bolts	85	63

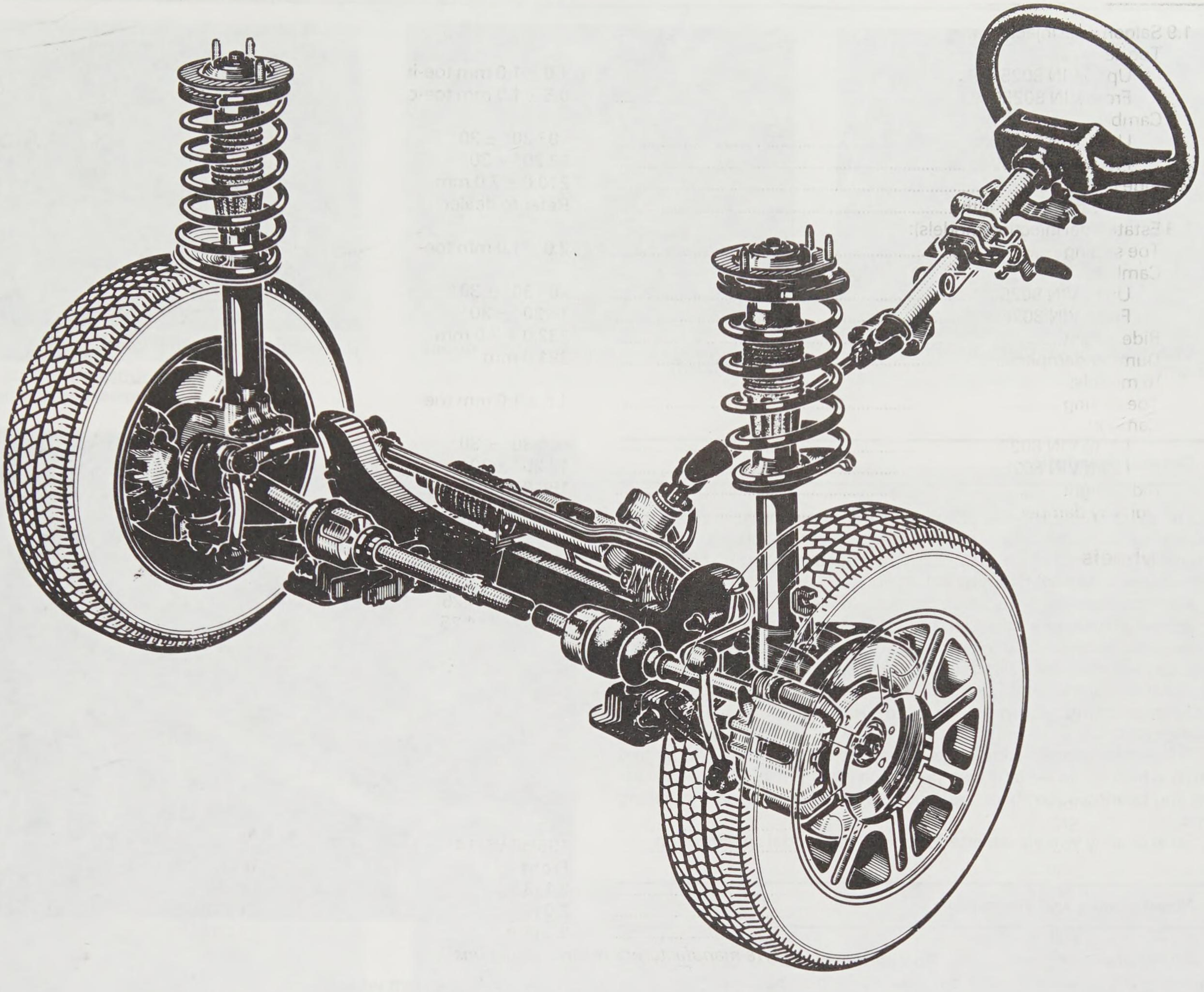


Fig 9.1 View of front suspension assembly (Sec 1)

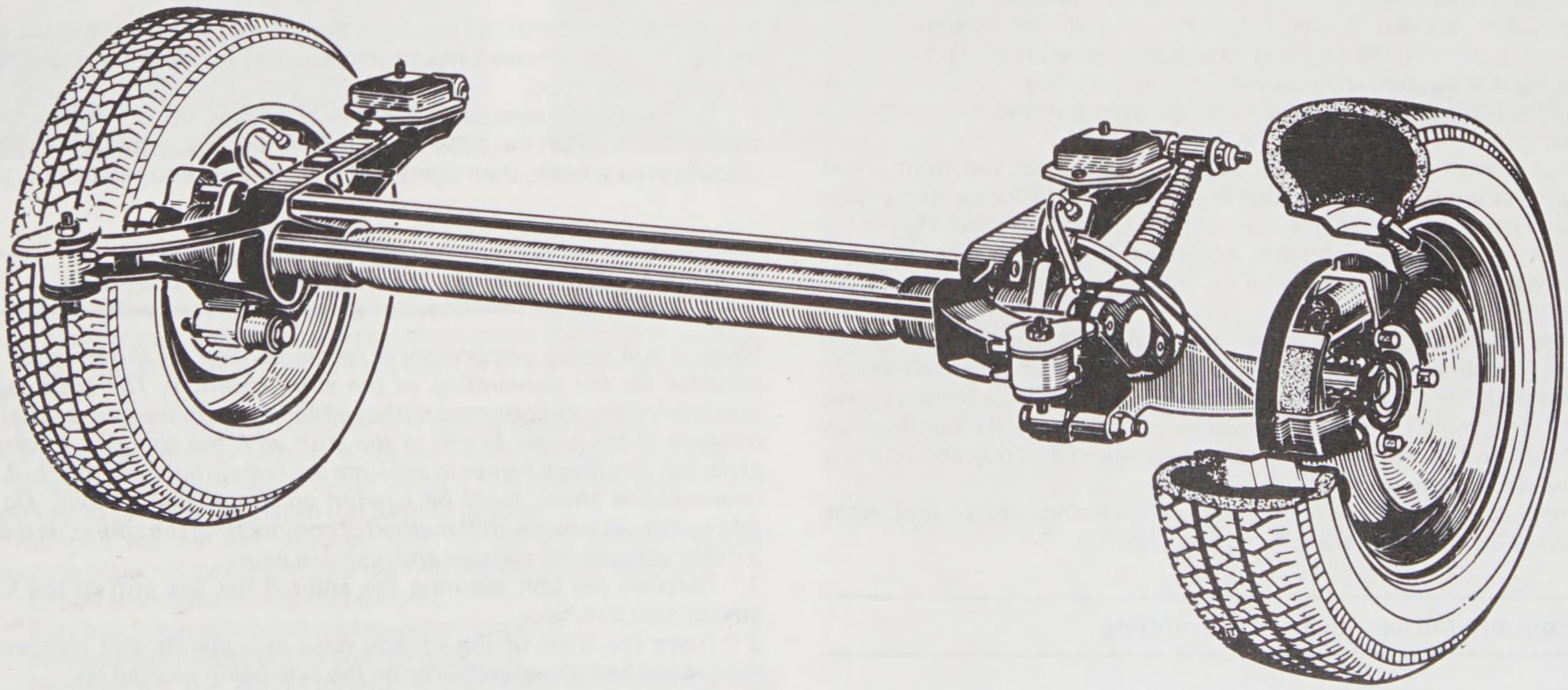
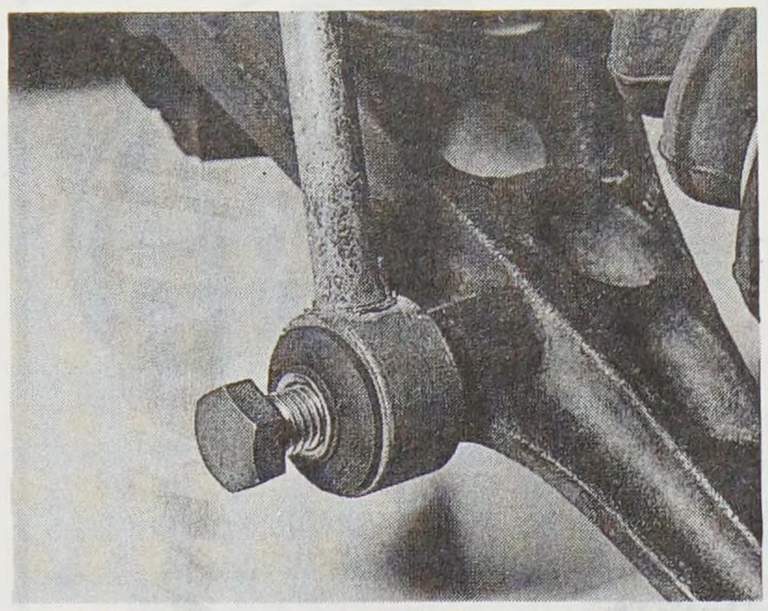
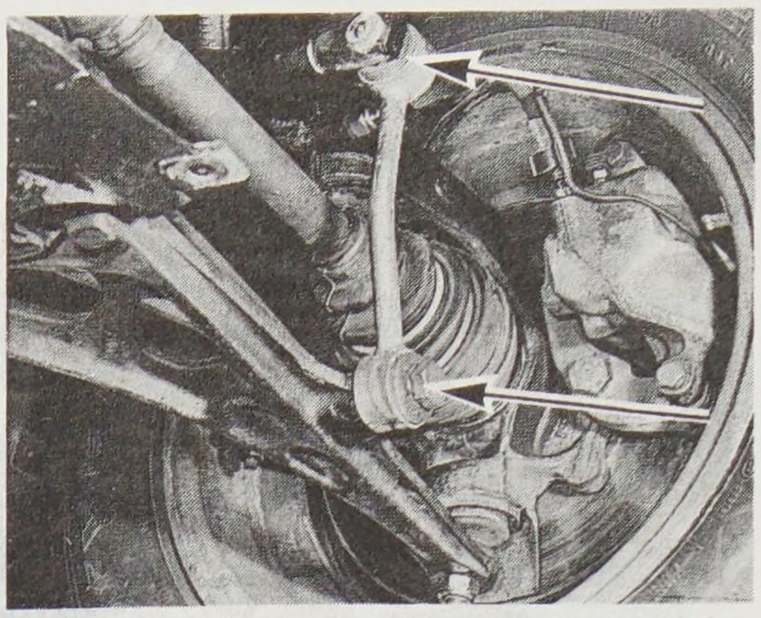


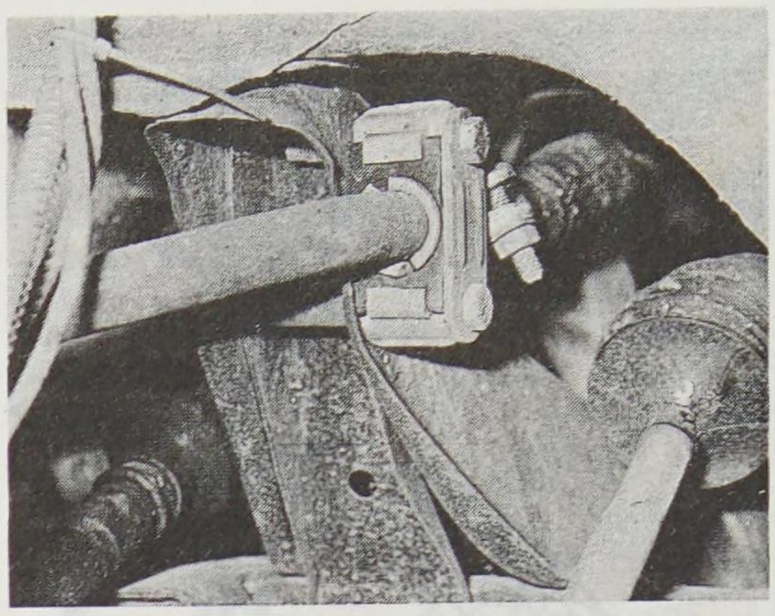
Fig 9.2 View of rear suspension assembly (Sec 1)



3.1A Removing lower bolt from anti-roll bar link arm



3.1B Showing upper and lower bolts on link arm (arrowed)



3.4A Anti-roll bar clamp bolts ...

1 General description

The front suspension is of independent type, incorporating MacPherson struts with coil springs and integral shock absorbers. The front anti-roll bar is clamped to the front subframe at each end and connected to the lower suspension arm by link rods.

Rear suspension is also independent, consisting of a cross-tube supported in the rear suspension frame. The trailing arms are mounted on the cross-tube on double bearings, with telescopic shock absorbers mounted between the trailing arms and the suspension frame. A torsion bar is fitted transversely between each trailing arm and the opposite suspension frame side member, with an anti-roll bar between the trailing arms.

The front hub and bearing assemblies are contained within the hub carrier which is carried at the ends of each MacPherson strut. The rear hub and bearing assemblies are mounted on stub axles on the trailing arms.

Steel or alloy wheels are fitted according to model specification.

2 Maintenance and inspection

At the intervals given in the 'Routine maintenance' *Section at the beginning of this manual, carry out the following operations.*

1 Check and adjust tyre pressures including the spare, ensuring the caps are securely fitted on completion.

2 Inspect the tyres for wear and damage as described in Section 18.

3 Raise the vehicle onto axle stands then grip each wheel in turn and try to rock the wheel on its stub axle. Any play will indicate wear in the bearings, but in the case of the front wheels ensure the play is not due to a worn lower suspension balljoint. No bearing adjustment is possible, and if the wear is excessive, the bearings must be renewed (Sections 8 or 15).

4 Again with the vehicle on axle stands, inspect the front lower balljoint for wear. Place a suitable lever between the lower suspension arm and front hub carrier and attempt to lever the two apart. Play in the balljoint must be imperceptible, otherwise it must be renewed. The balljoint must also be renewed if the rubber gaiter is split or damaged (Section 7).

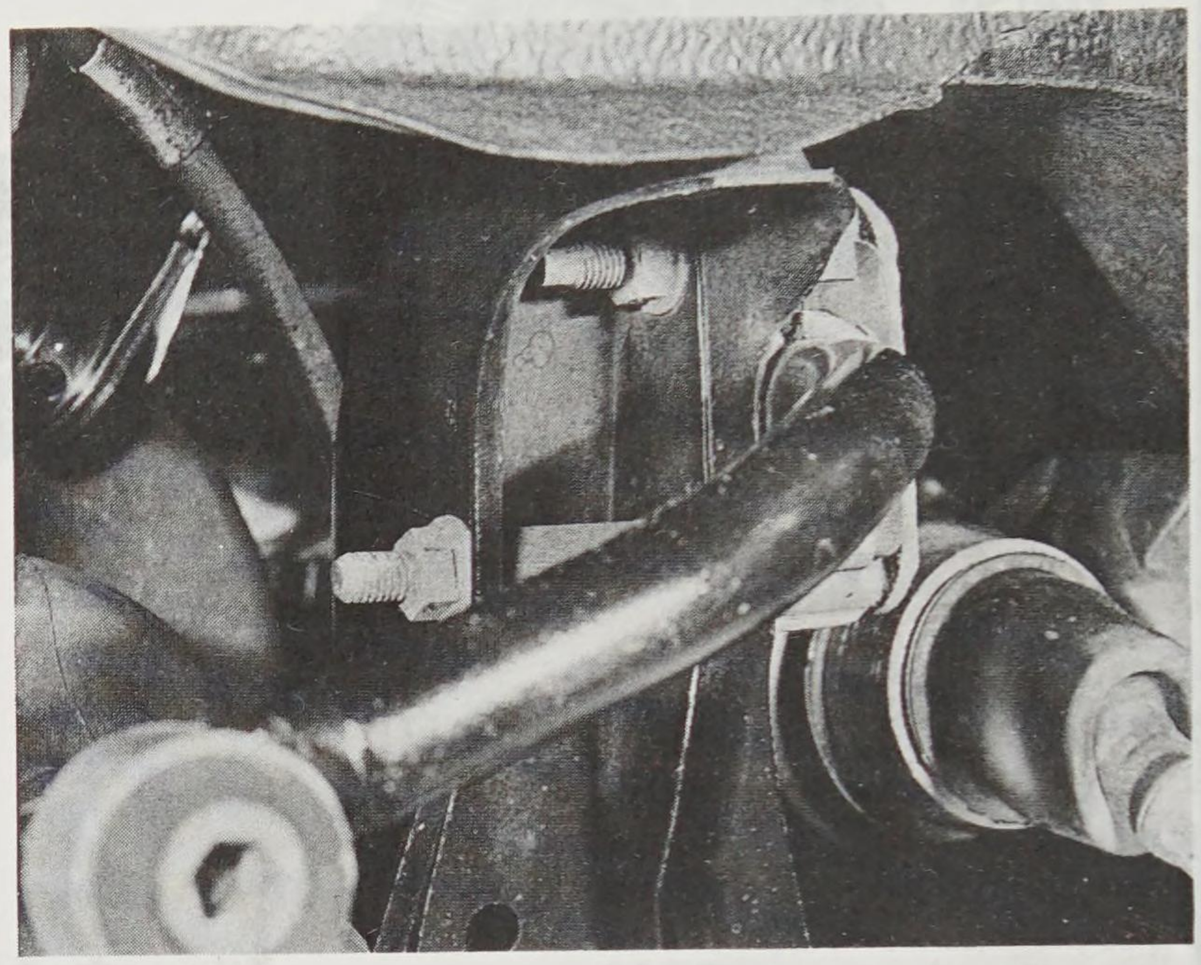
5 Inspect the shock absorbers for fluid leakage and their rubber gaiters for splits or damage, either of which will mean their renewal. To test the action of the shock absorbers, bounce the vehicle at each corner in turn. The vehicle should immediately return to rest. If it continues to spring up and down, the shock absorbers are ineffective and must be renewed (Sections 4 and 11).

6 Inspect all suspension bushes for hardening, cracks and wear, renewing them as necessary (Sections 5 and 17).

3 Front anti-roll bar – removal and refitting

1 With the vehicle standing on its wheels, remove the lower bolt from the anti-roll bar link arm to lower suspension arm (photos).

2 Raise the vehicle onto axle stands and remove the upper bolt and link arm.



3.4B ... and nuts

3 Remove the front wheels.

4 Make alignment marks across the anti-roll bar and the clamps securing the bar to the front subframe so that the anti-roll bar can be refitted in exactly the same position, then remove the clamp bolts and clamps (photos).

5 Withdraw the anti-roll bar from the vehicle. If the inner clamps on the bar are to be removed, mark their positions on the bar and refit them in the same position.

6 Refitting is a reversal of removal, lining all up previously made marks. Only tighten the bolts finger tight until the weight of the vehicle is back on its wheels, then tighten all bolts to the specified torque.

4 Front suspension strut – removal, overhaul and refitting

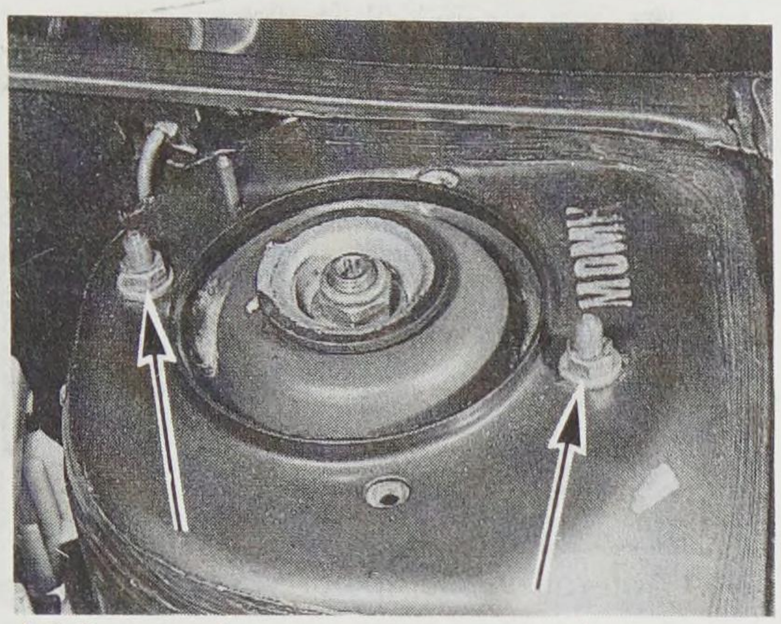
Note: *A coil spring compressor is recommended for the removal, and essential for the dismantling, of the strut assembly. The strut can be removed without a compressor (the coil spring is captive on the strut), but because of the longer length of the strut with the spring in a released state, it is that much harder to separate the hub carrier from the strut, and unacceptable strain could be exerted on the driveshaft joint. Do not attempt to use a make-shift method of compressing the spring, as there is a risk of component damage and personal injury.*

1 Remove the bolt securing the anti-roll bar link arm to the lower suspension arm.

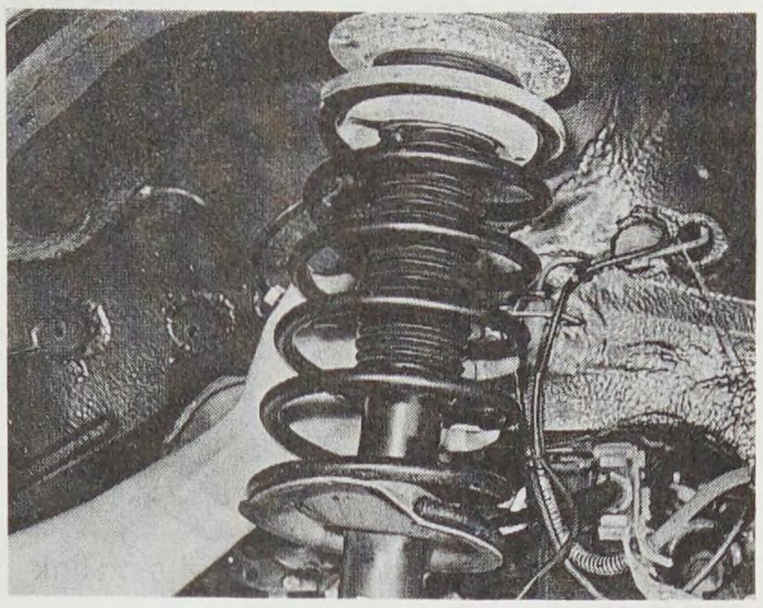
2 Raise the front of the vehicle onto axle stands and remove the roadwheel and wheel arch liner on the side being worked on.

3 Slacken, but do not remove, the two nuts on the strut upper mounting (photo).

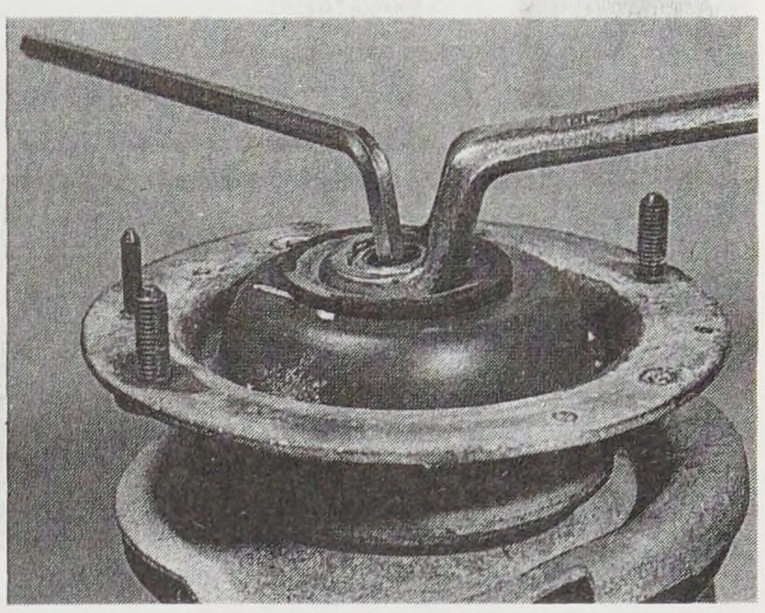
4 Remove the hub carrier-to-suspension strut clamp bolt, then drive a cold chisel into the clamp to open it out.



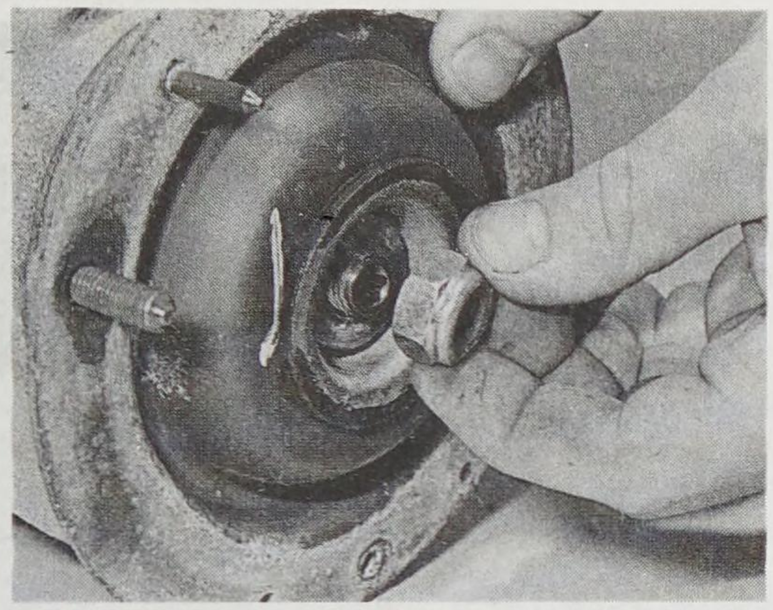
4.3 Suspension strut upper mounting retaining nuts (arrowed)



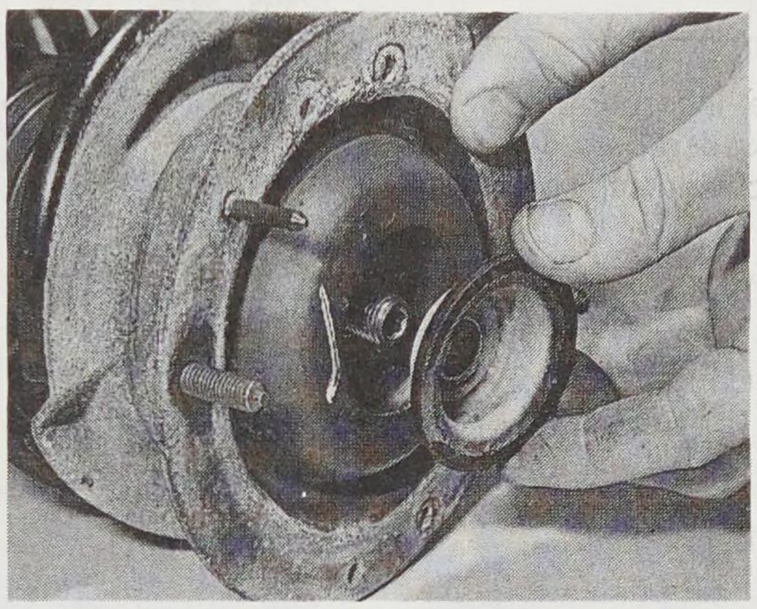
4.5 Lowering the suspension strut from the wheel housing



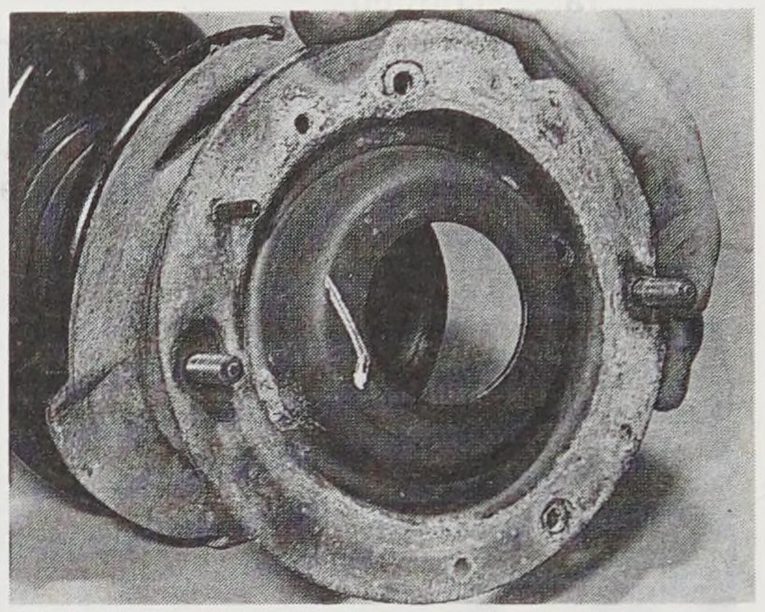
4.8 Unscrewing the top mounting nut



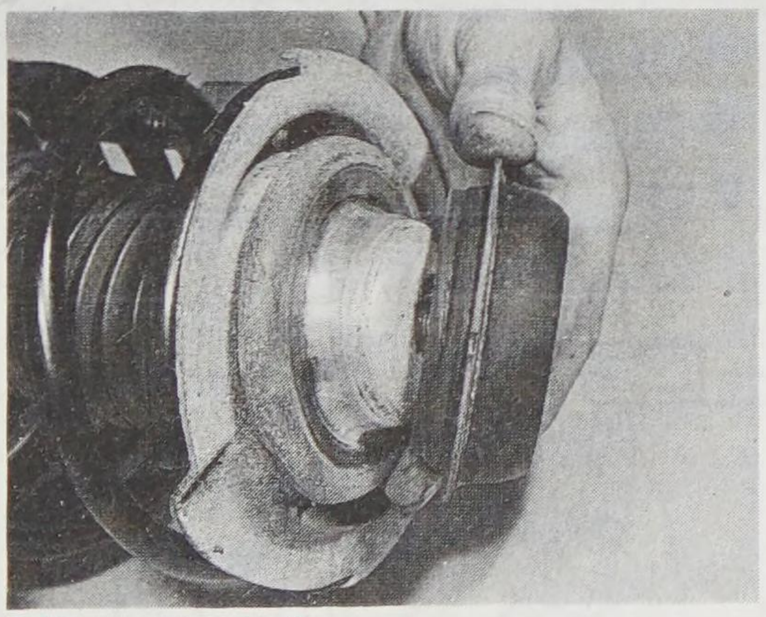
4.9A Remove the nut and washer, then lift off ...



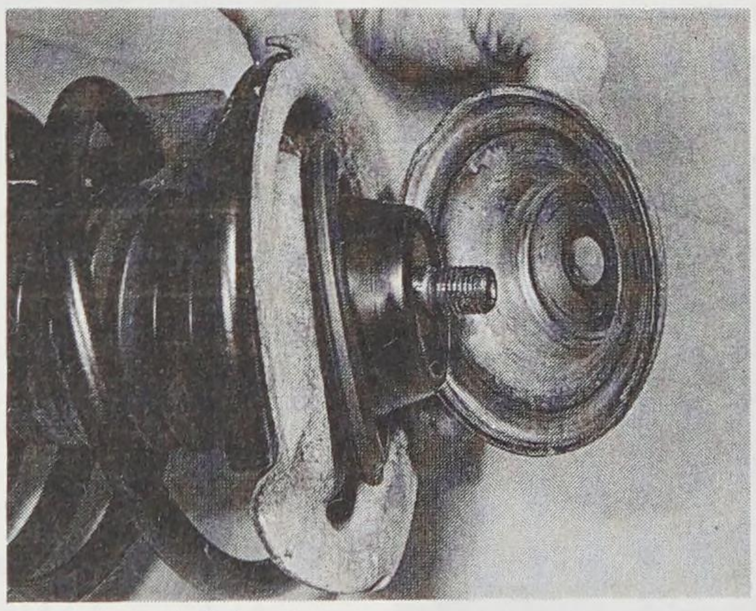
4.9B ... the cupped washer ...



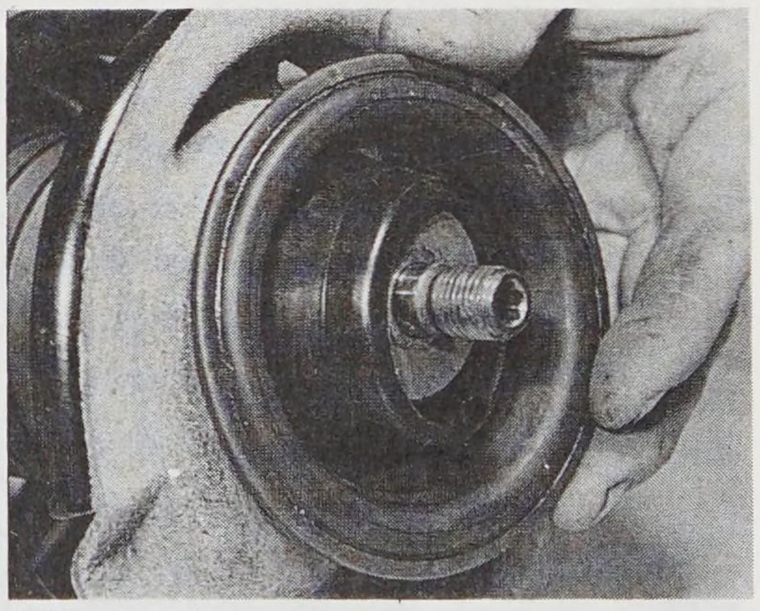
4.9C ... mounting plate ...



4.9D ... rubber buffer ...



4.9E ... and dished ...



4.9F ... plates

5 Remove the two top mounting nuts, separate the strut from the hub carrier and remove the strut assembly from under the vehicle (photo).

6 Clean the strut externally then mount it in a vice with protected jaws.

7 If not already done, fit suitable coil spring compressors and compress the spring until all tension is released from the top mounting.

8 Unscrew the top mounting nut using a ring spanner, and a 7 mm Allen key to prevent the piston rod turning (photo).

9 Remove the nut and washer, then lift off the cupped washer, mounting plate, rubber buffer and the two dished plates (photos).

10 Lift off the upper spring seat (photo).

11 Remove the washer and rubber gaiter (photos).

12 Remove the rubber bump stop (photo).

13 Remove the coil spring (photo). If the spring is to be renewed, remove the compressors, otherwise leave them in position for reassembly.

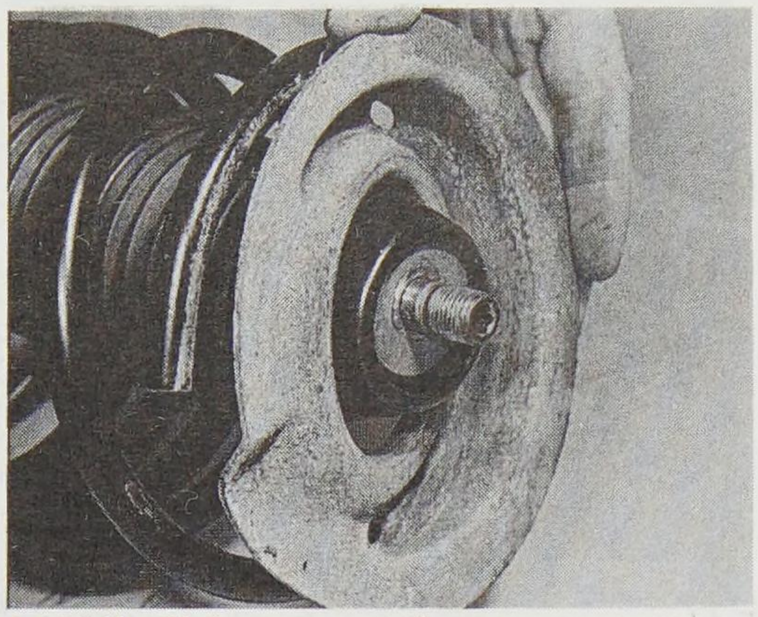
14 Inspect the struts for signs of leakage from the piston rod seal. With the strut held vertically, operate the piston over its full range of movement in both directions, checking that the resistance is even and firm. If the resistance is weak or jerky, if there is fluid seepage, or if there is any damage to the strut or corrosion of the piston rod, the strut must be renewed (photo). At the same time check the coil springs for condition, and any signs of distortion or damage. If spring renewal is necessary note that this must be done in pairs to maintain even ride height and handling characteristics. Spring identification is by colour code according to model and equipment specification.

15 Refitting is a reversal of removal, noting the following points.

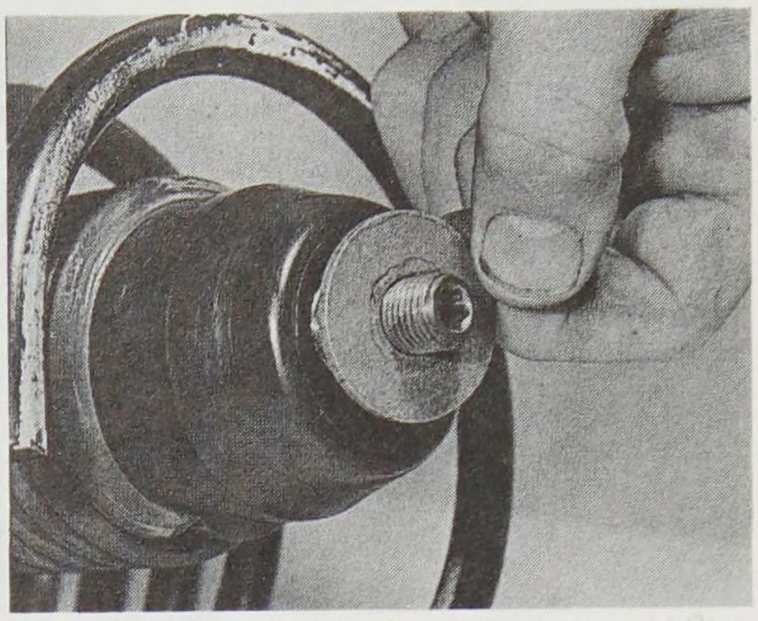
(a) The springs must be properly engaged in the depressions in the spring seats (photo)

(b) The hub carrier must be fully engaged in the lug welded to the strut. This engagement can be ensured by not fully tightening the clamp bolt until the weight of the vehicle is on the ground

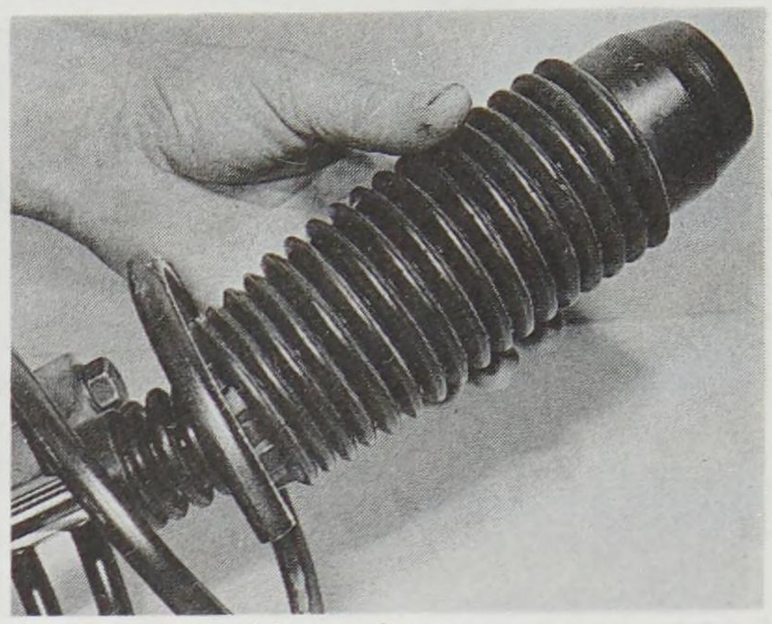
(c) Tighten all remaining nuts and bolts to the specified torque with the weight of the vehicle on the ground



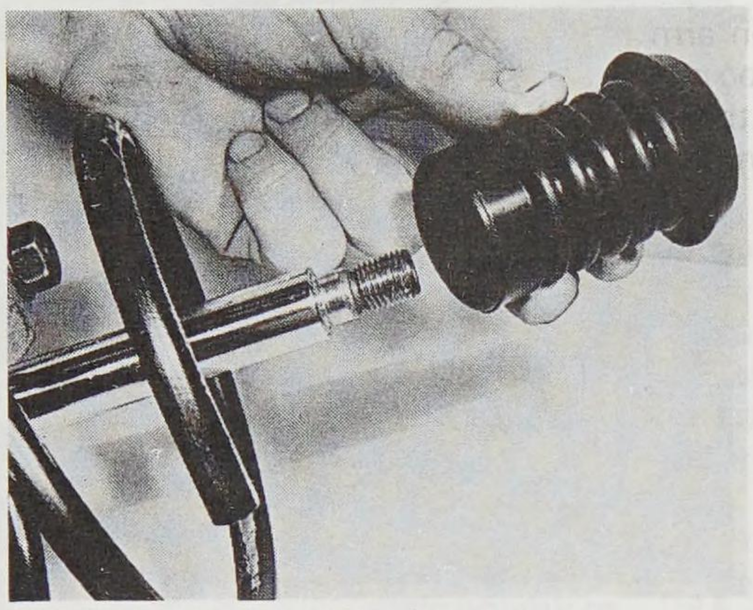
4.10 Lift off the upper spring seat



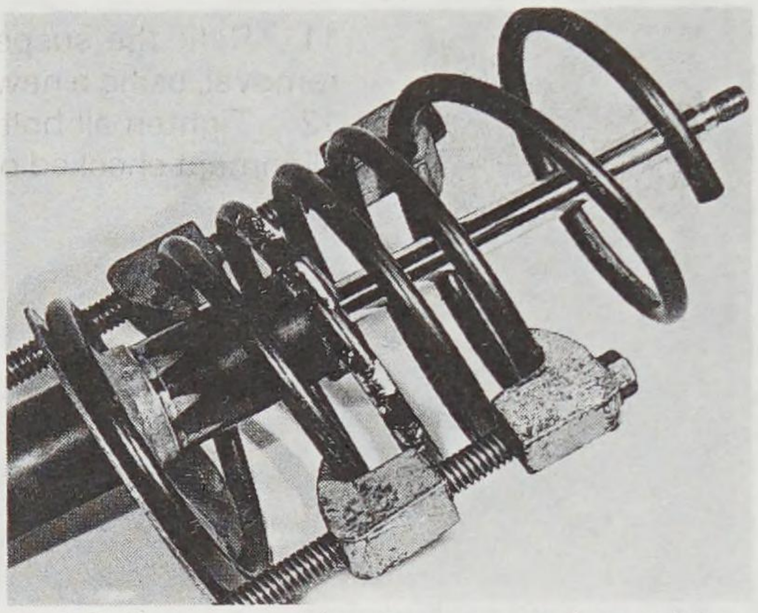
4.11A Remove the washer ...



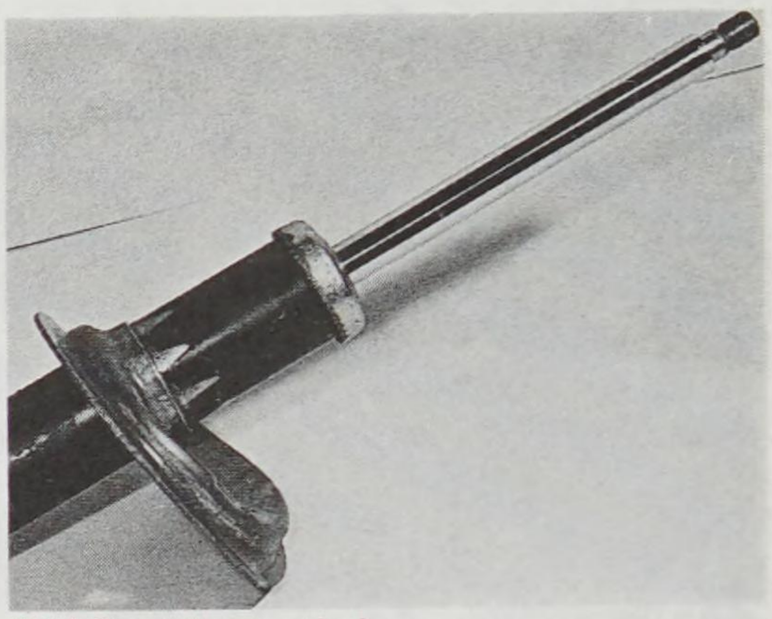
4.11B ... and rubber gaiter



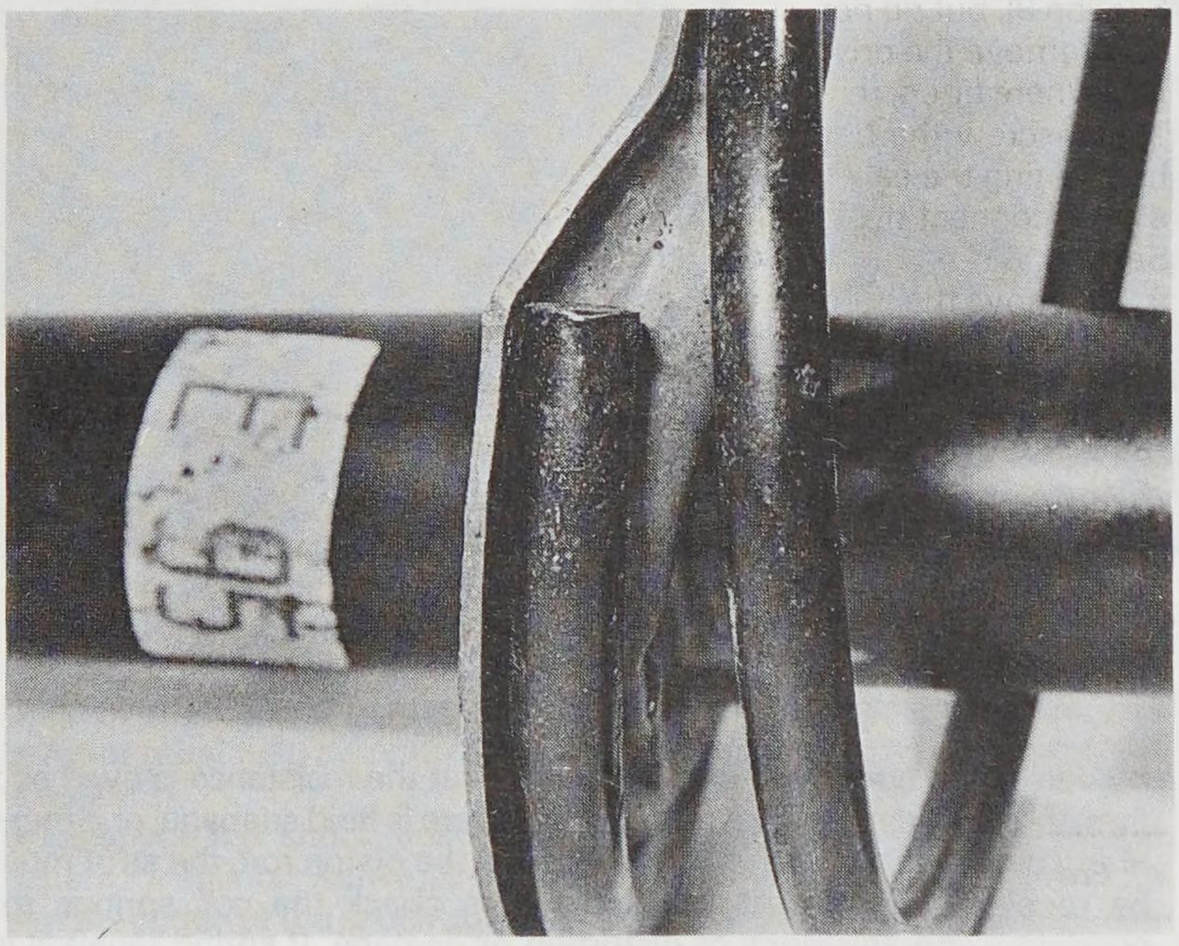
4.12 Remove the rubber bump stop



4.13 Coil spring with compressors in position



4.14 Strut dismantled



4.15 Spring location in spring seat

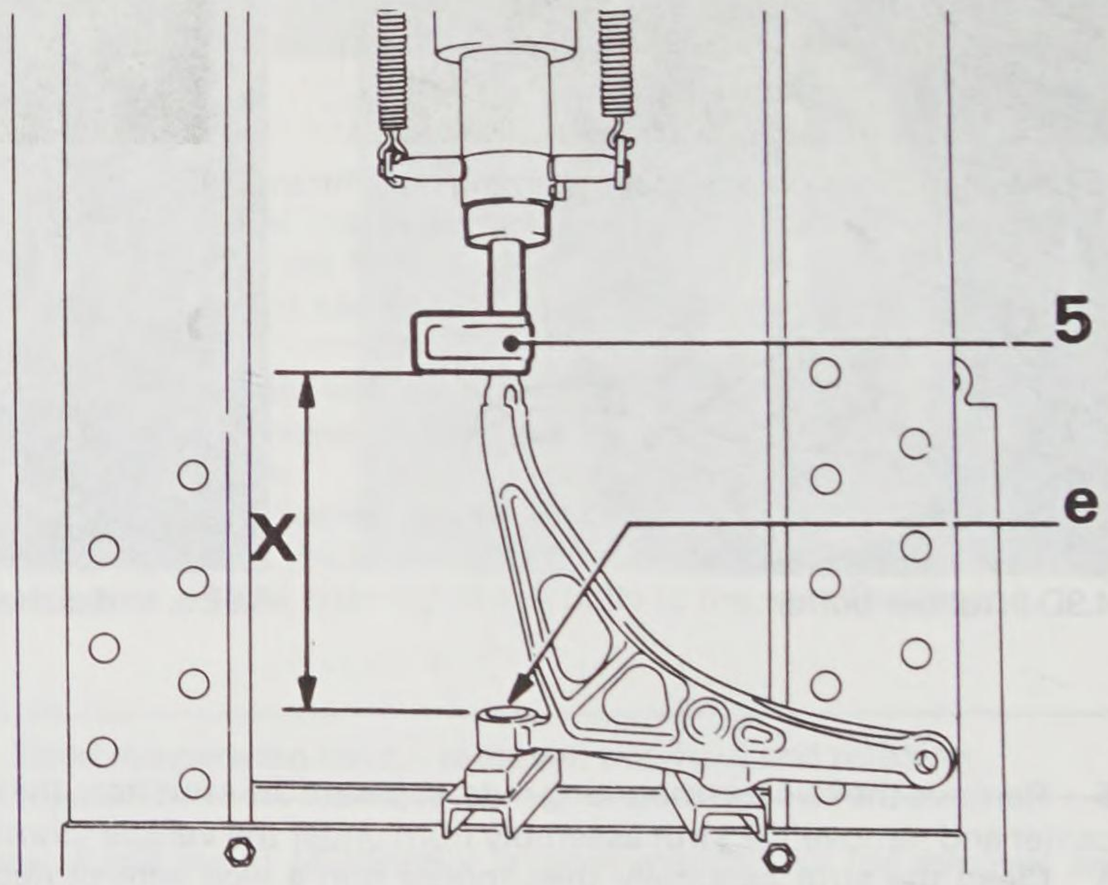
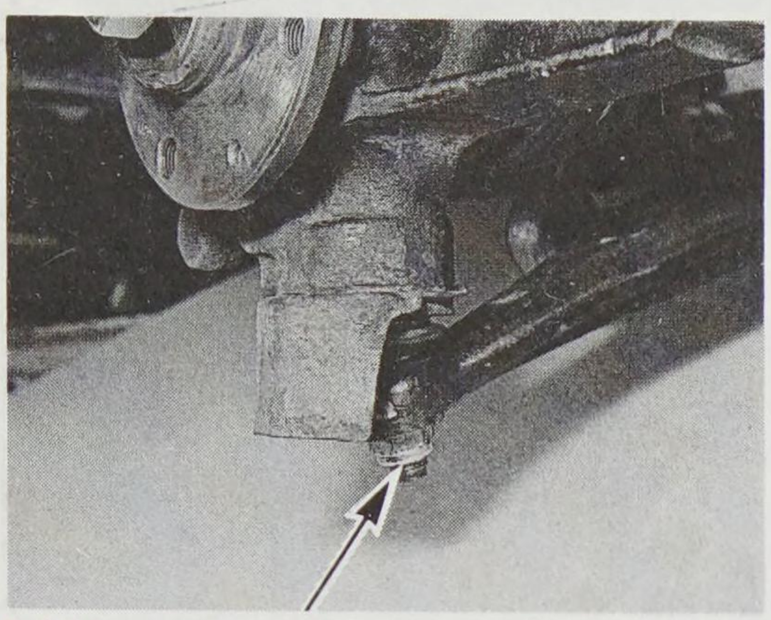


Fig 9.3 Front lower suspension arm bush fitting dimension (Sec 5)

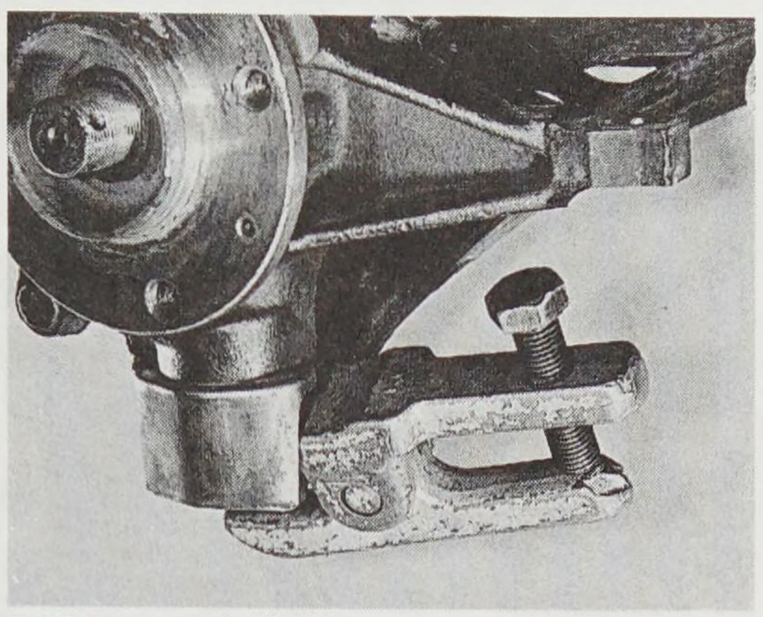
5 Bush assembly
X = 254.0 mm (10.0 in)
e Area to apply lubricant

5 Front lower suspension arm – removal and refitting

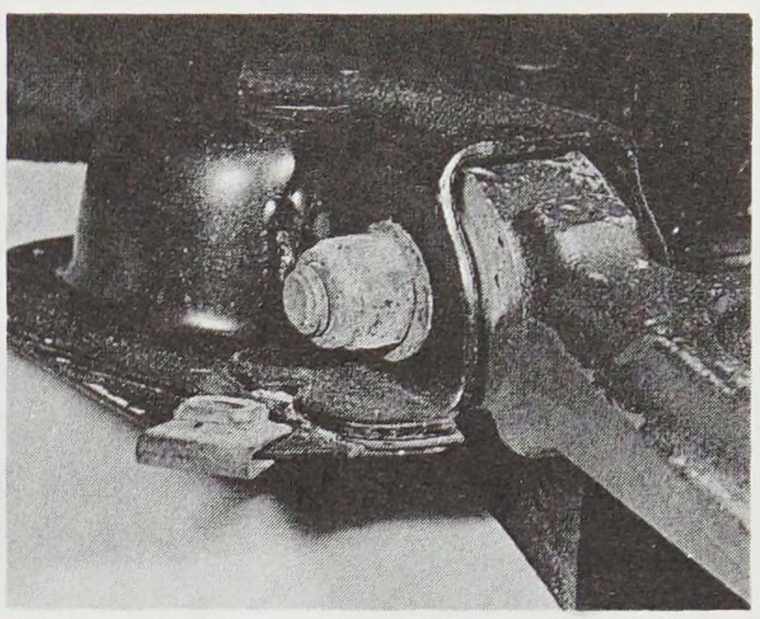
1 Remove the bolt securing the front anti-roll bar to the suspension arm.
2 Raise the vehicle onto axle stands and remove the front road-wheels.
3 Remove the lower suspension arm balljoint nut, use a balljoint separator tool to 'break' the balljoint taper, then use a long bar to lever the arm free from the balljoint. Take care not to damage the balljoint rubber gaiter (photos).
4 Remove the suspension arm front pivot bolt (photo).
5 Remove both nuts from the rear mounting (photo).
6 Loosen the subframe front mounting bolts by one or two turns.
7 Withdraw the suspension arm.
8 Inspect the suspension arm bushes for hardening, cracks or deterioration and renew them if necessary as follows.
9 Using a press if it is available, or a large vice and suitable size sockets as a mandrel, press out the front bush. The rear bush assembly can be removed with a two-legged puller.



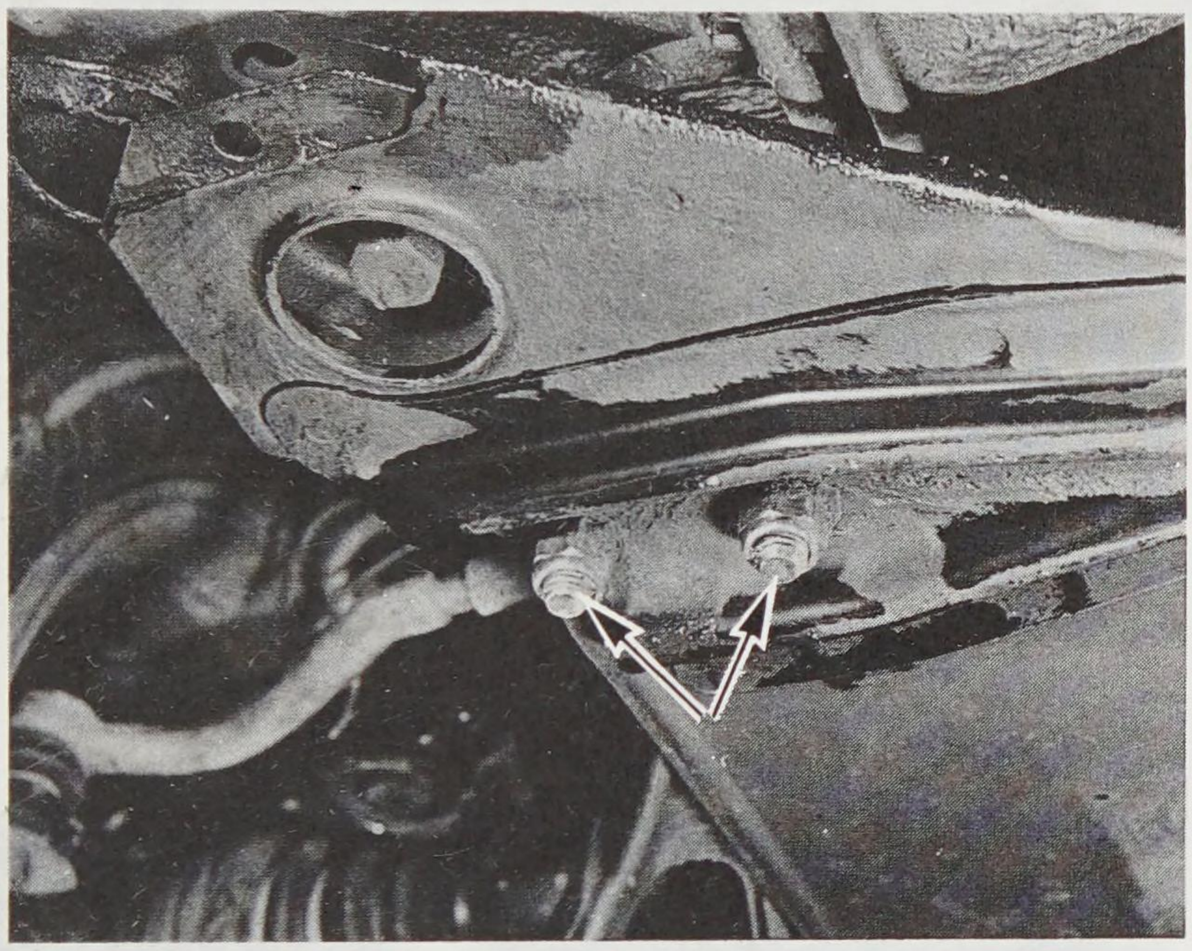
5.3A Lower suspension arm balljoint nut (arrowed)



5.3B Using a balljoint separator



5.4 Lower suspension arm front pivot bolt



5.5 Lower suspension arm rear mounting nuts (arrowed)

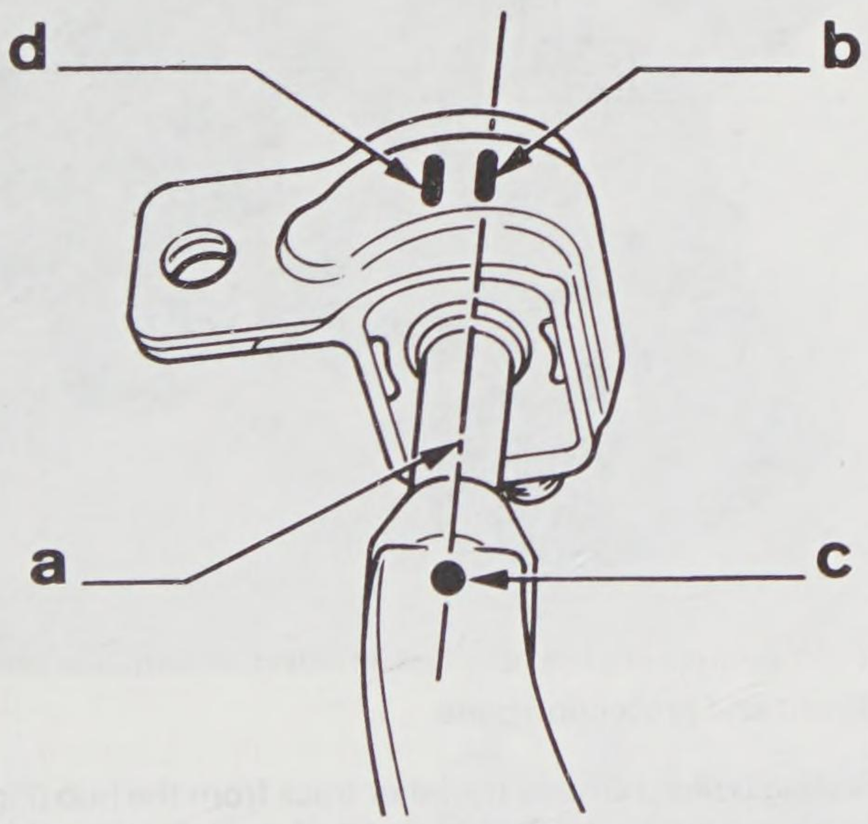


Fig 9.4 Alignment marks on rear bush (Sec 5)

a Area to apply lubricant
b Alignment mark
c Alignment mark
d Ignore

10 Fit new bushes, pressing them on to obtain the dimension shown in Fig. 9.3, and observing the alignment marks on the rear bush assembly. Note that some bushes have two alignment marks. In this case, the one nearest the bolt hole should be ignored (Fig. 9.4). Use a little silicone lubricant to ease fitment of the bushes.

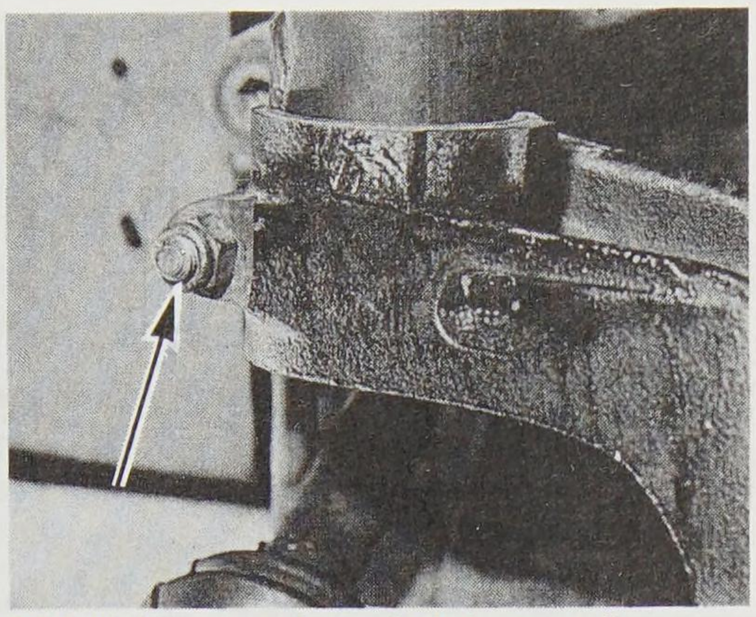
11 Refit the suspension arm to the vehicle, which is a reversal of removal, using a new nyloc nut on the lower balljoint.
12 Tighten all bolts to their specified torque, and have the steering alignment checked on completion.

6 Front suspension hub carrier – removal and refitting

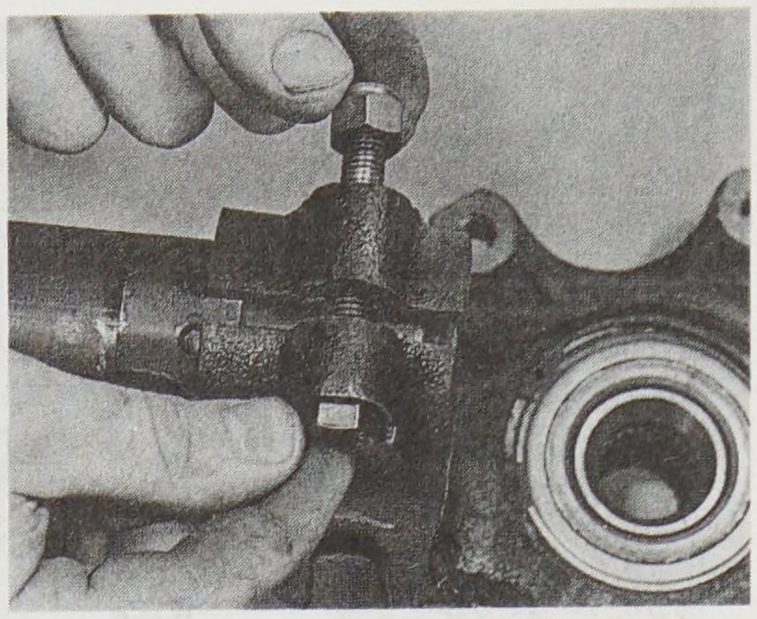
1 Remove the bolt securing the anti-roll bar to the lower suspension arm.
2 Raise the vehicle onto axle stands and remove the roadwheels.
3 Disconnect the steering track rod end balljoint from the hub carrier (Chapter 10, Section 9).
4 Remove the brake calliper and tie it up out of the way (Chapter 8, Section 9), but do not remove the hydraulic hose.
5 Remove the driveshaft nut (Chapter 7, Section 3).
6 Where fitted, remove the ABS wheel sensor (Chapter 8, Section 28).
7 Unscrew the bolt securing the brake hose support bracket to the hub, noting the earth lead under the bolt.
8 Disconnect the lower balljoint from the hub carrier as described in Section 5.
9 Remove the hub carrier-to-suspension strut clamp bolt, then drive a cold chisel into the clamp to open it out (photos).
10 Pull the hub outwards, at the same time pushing the driveshaft inward. Once the driveshaft is free from the hub, lower the hub from the suspension strut and withdraw it from the vehicle (photo).
11 Refitting is a reversal of removal, but note that the hub clamp must enter the lug welded to the suspension strut (photo). Full engagement of the lug and clamp can be ensured by not tightening the clamp bolt until the weight of the vehicle is back on the ground.

7 Front suspension lower balljoint – renewal

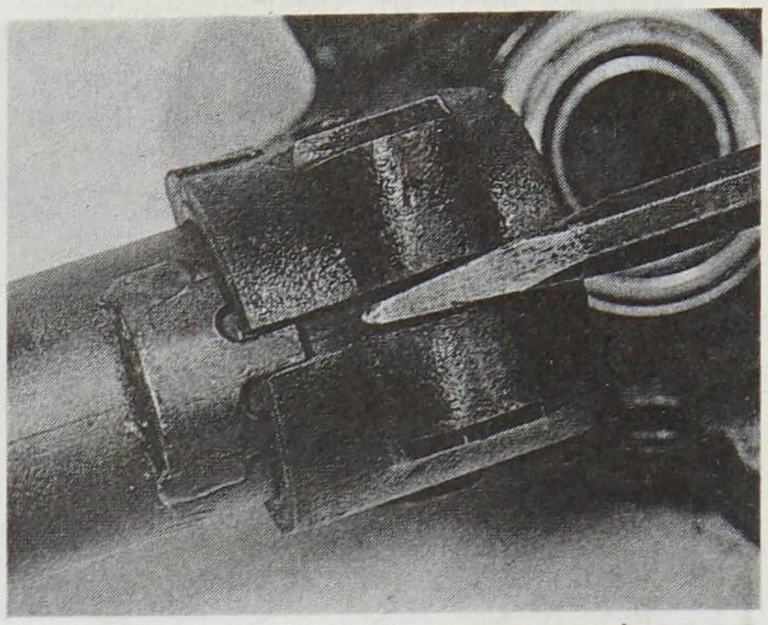
Note: *A special adaptor (shown in Fig. 9.5) is required for removal of the balljoint from the hub. If this tool is not available, remove the hub carrier and take it to your dealer for balljoint renewal.*
1 Remove the hub carrier as described in Section 6.
2 Secure the hub in a vice.
3 Prise off the balljoint protection plate (photo).
4 Using the special adaptor, unscrew the balljoint from the hub carrier. It will be extremely tight.
5 Clean out the threads on the hub carrier, then screw in the new balljoint as far as possible by hand.
6 Use the adaptor to tighten the balljoint to the specified torque.
7 Stake the balljoint to the hub carrier.
8 Fit the protective plate and stake it to the balljoint.
9 Refit the hub carrier as described in Section 6.



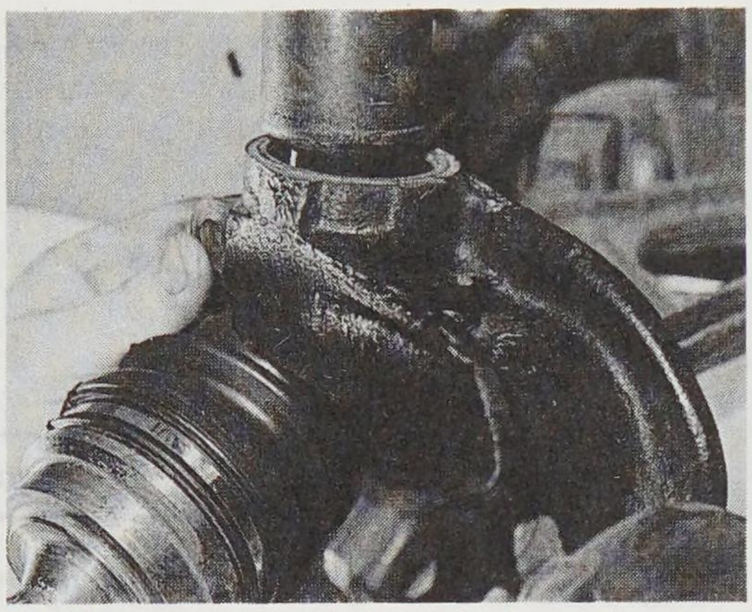
6.9A Hub carrier clamp bolt (arrowed)



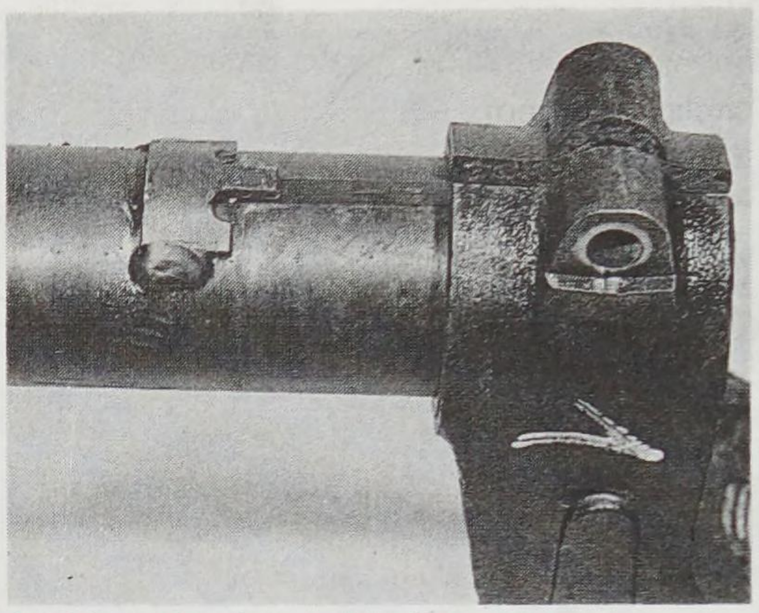
6.9B View of the clamp and bolt (hub and strut removed for clarity)



6.9C Using a cold chisel to open out the clamp (hub and strut removed for clarity)



6.10 Removing the hub carrier from the strut



6.11 Locating lug welded to strut

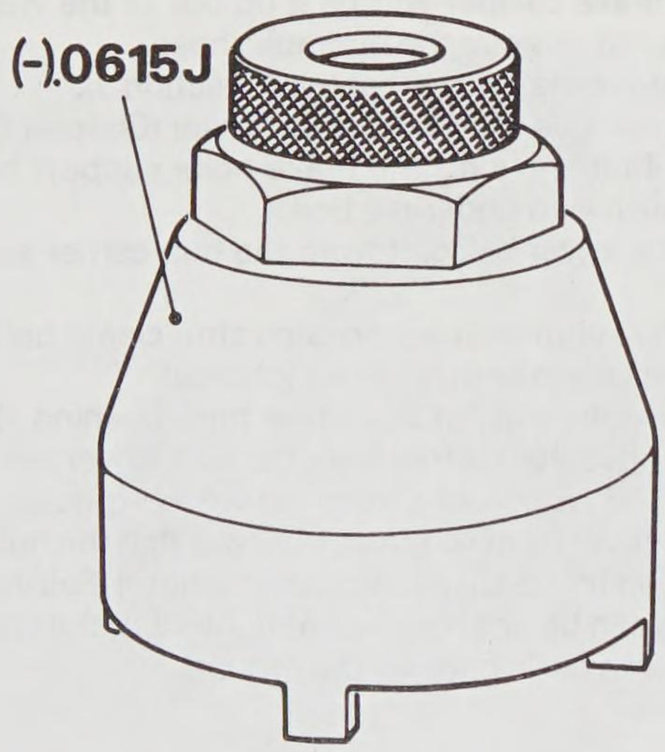
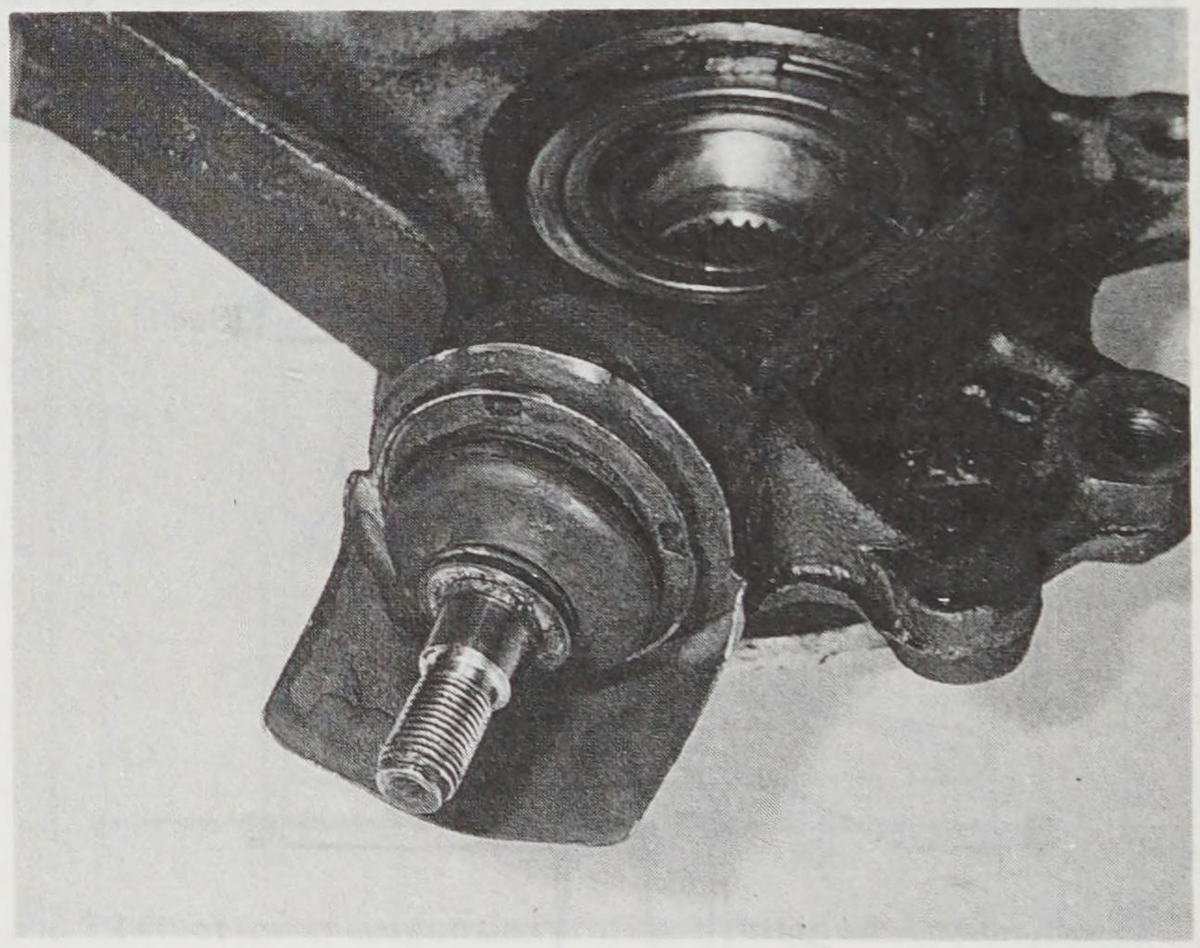


Fig 9.5 Front suspension lower balljoint adaptor tool (Sec 7)



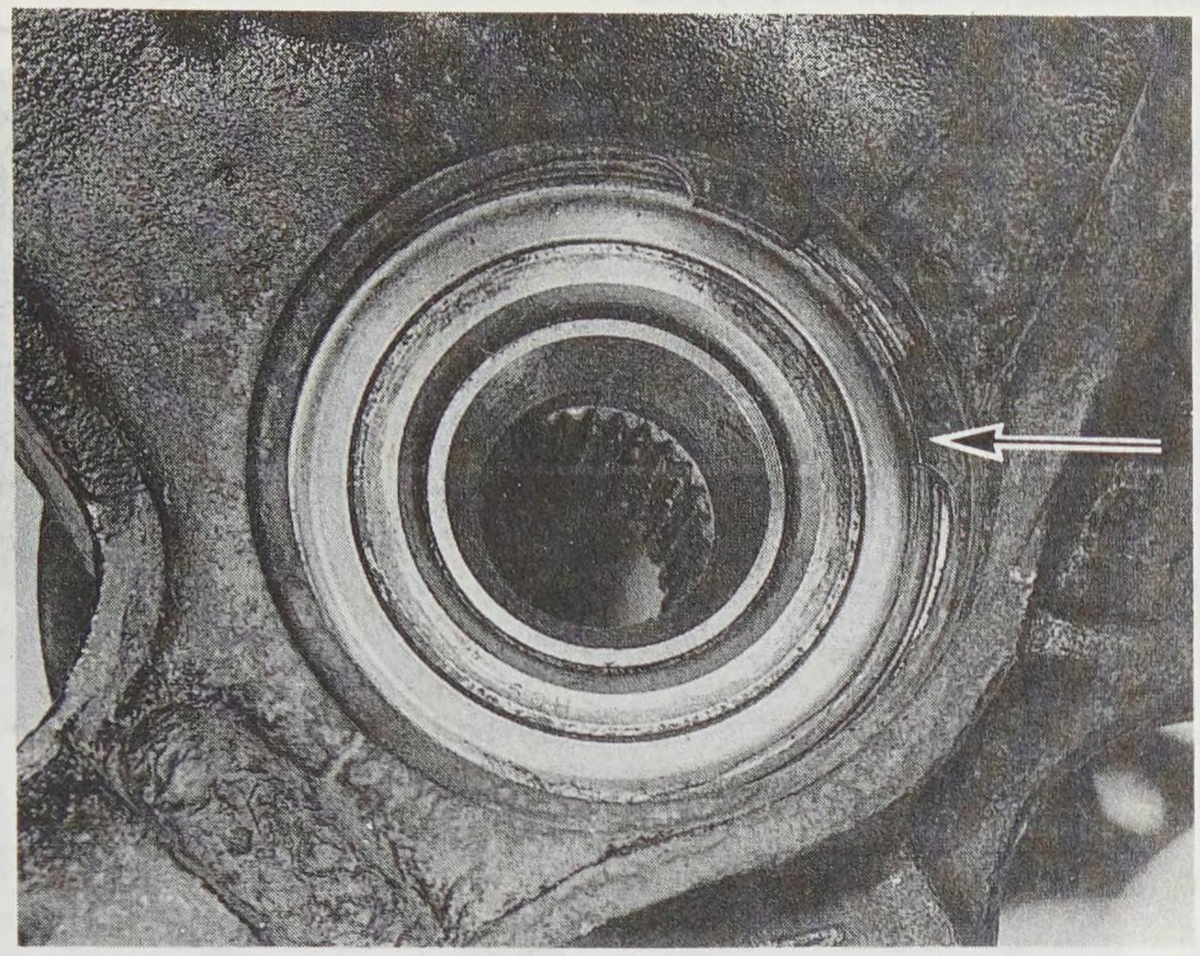
7.3 Lower balljoint and protection plate

8 Front hub and bearings – renewal

1 Remove the hub carrier as described in Section 6.
2 The bearings, once removed, must be renewed as they are destroyed on removal.
3 The removal of the bearings requires a high load press and special pullers. If these are not available take the removed hub carrier to your dealer for bearing renewal.
4 If suitable equipment is available, proceed as follows.
5 Remove the bearing retaining circlip (photo).
6 Extract the hub from the carrier using a puller arrangement as shown in Fig. 9.6.
7 Prise off the ring from the hub.
8 Using a bearing puller, remove the inner track from the hub (Fig. 9.7).
9 Position the inner track into the bearing in the carrier then drive out the bearing from the carrier using a press (Fig. 9.8).
10 Fitting the new bearing is a reversal of removal (Figs. 9.9 and 9.10). There is no bearing adjustment.
11 Refit the carrier to the vehicle as described in Section 6.

9 Front subframe – removal and refitting

1 Remove both lower front suspension arms as described in Section 5.



8.5 Bearing retaining circlip (arrowed)

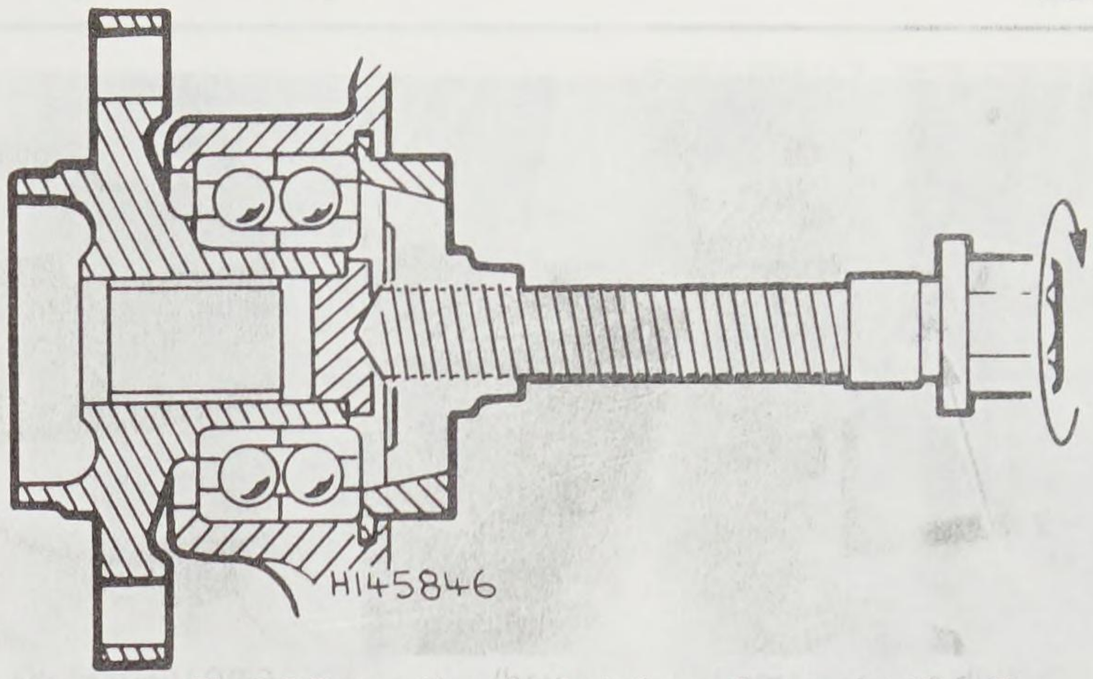


Fig 9.6 Extracting the hub from the carrier (Sec 8)

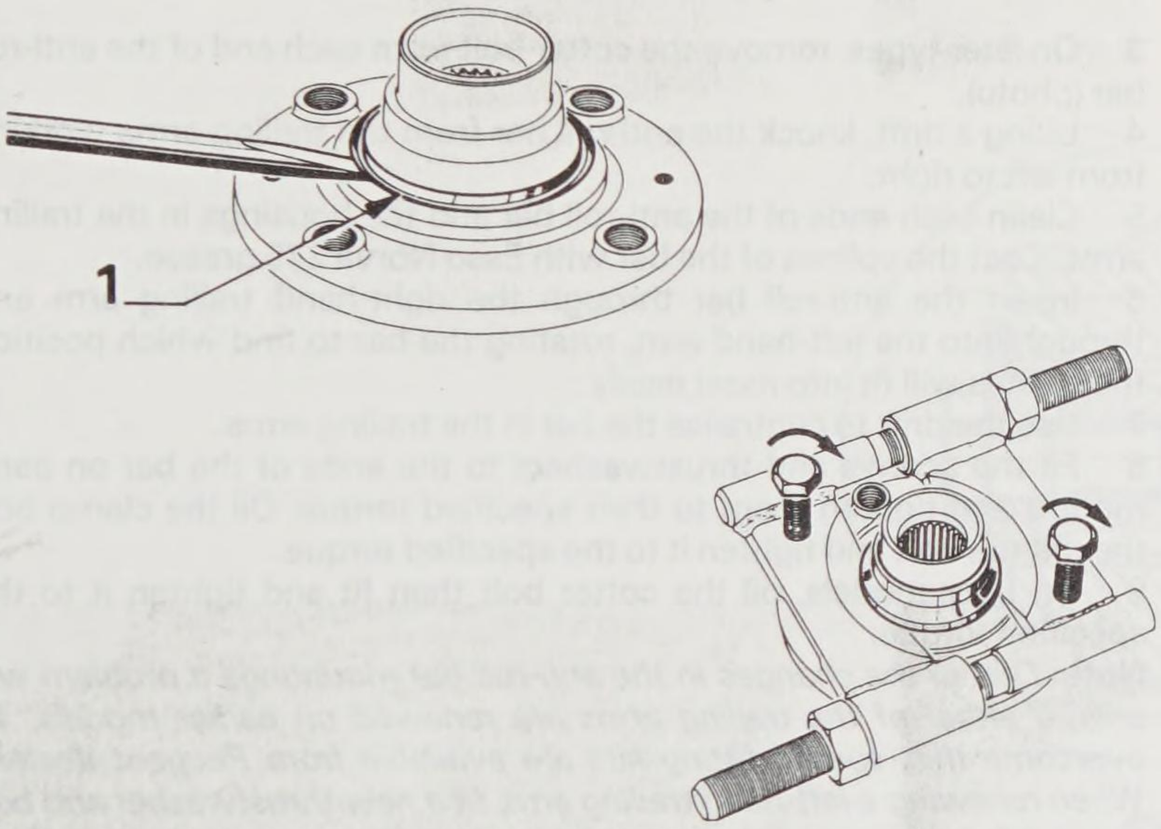


Fig 9.7 Removing inner track from hub (Sec 8)

1 Prising off the ring

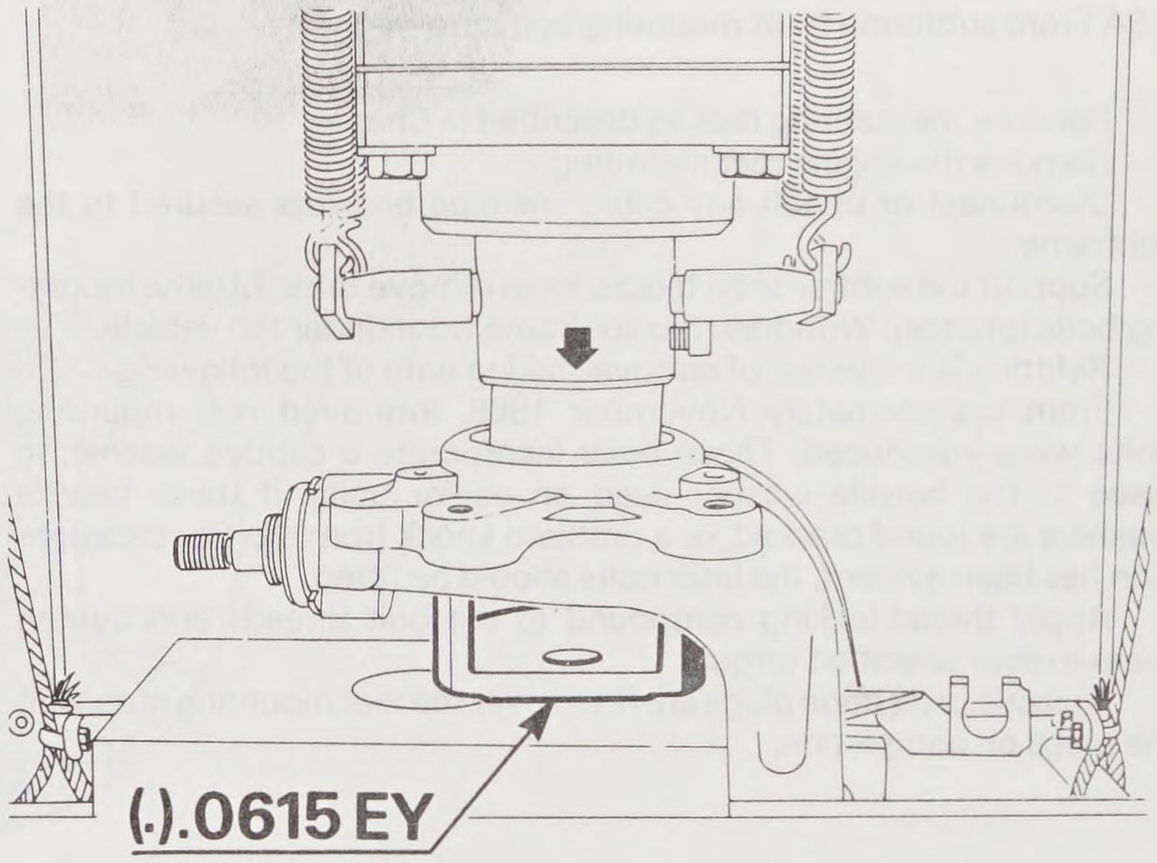


Fig 9.8 Pressing out the bearing from carrier (Sec 8)

Peugeot special support tool shown

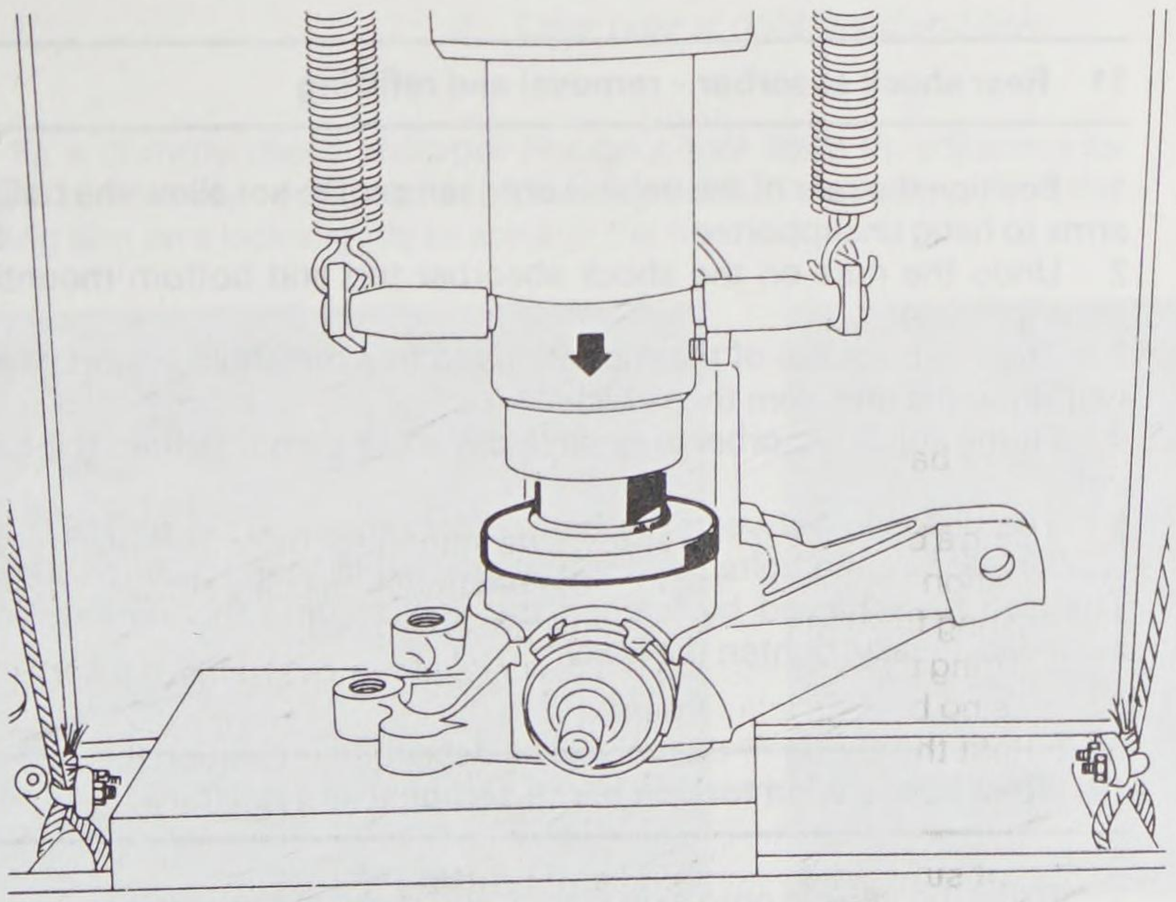


Fig 9.9 Pressing new bearing into carrier (Sec 8)

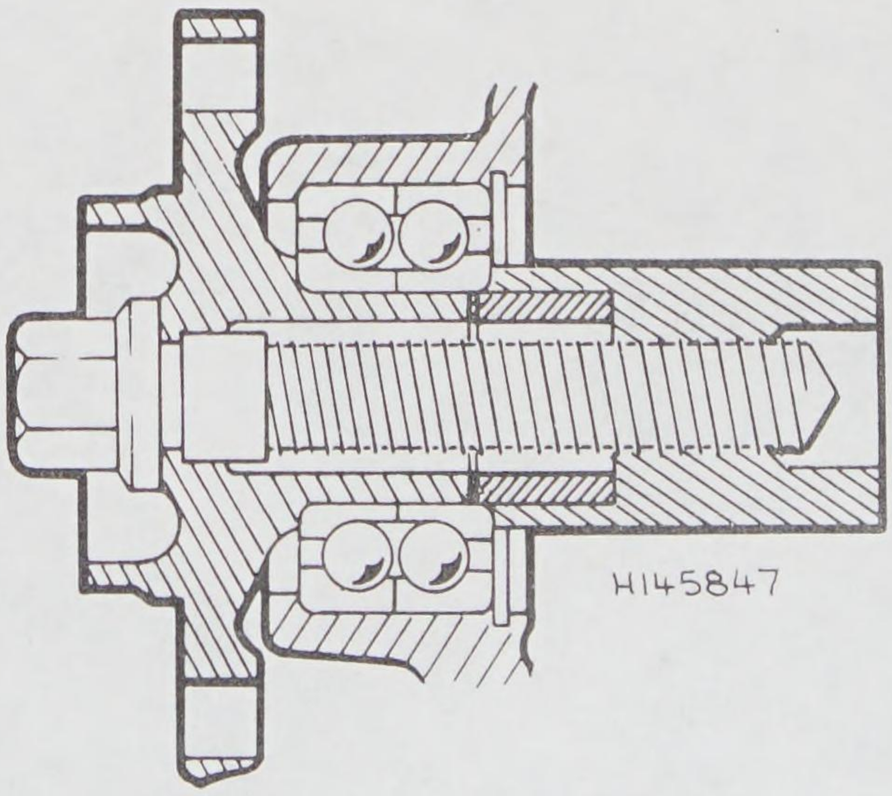
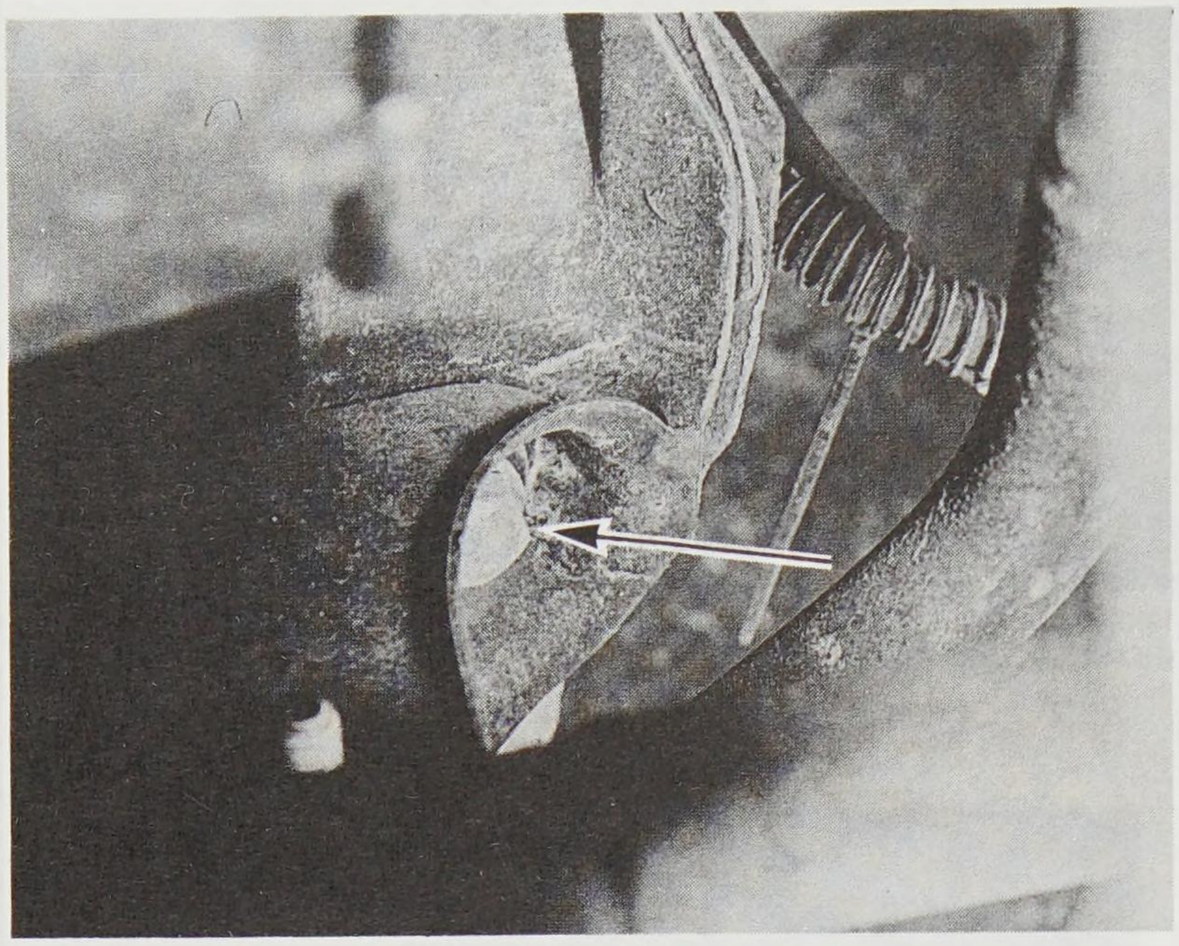
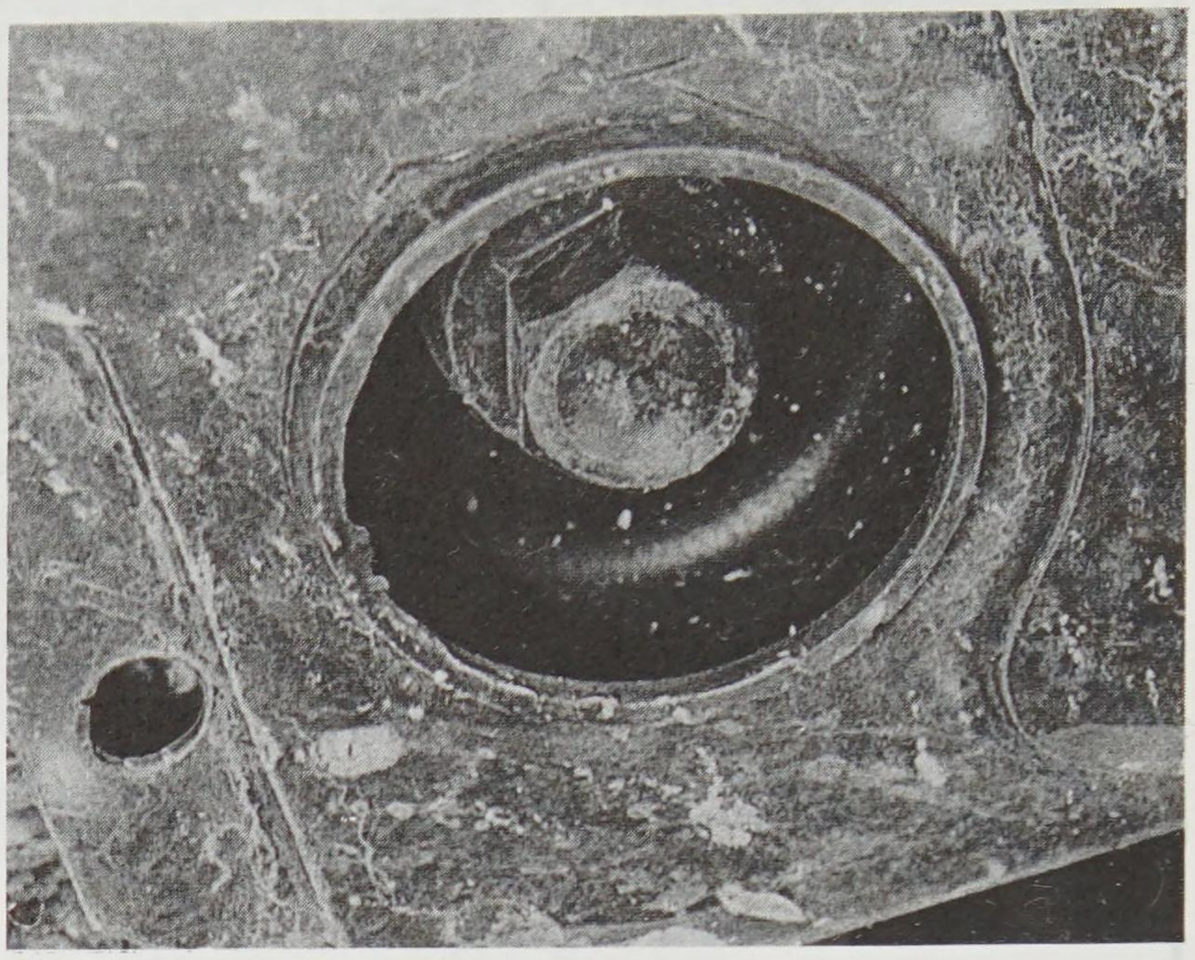


Fig 9.10 Driving hub into carrier (Sec 8)



9.5A Front subframe front mounting bolt (arrowed)

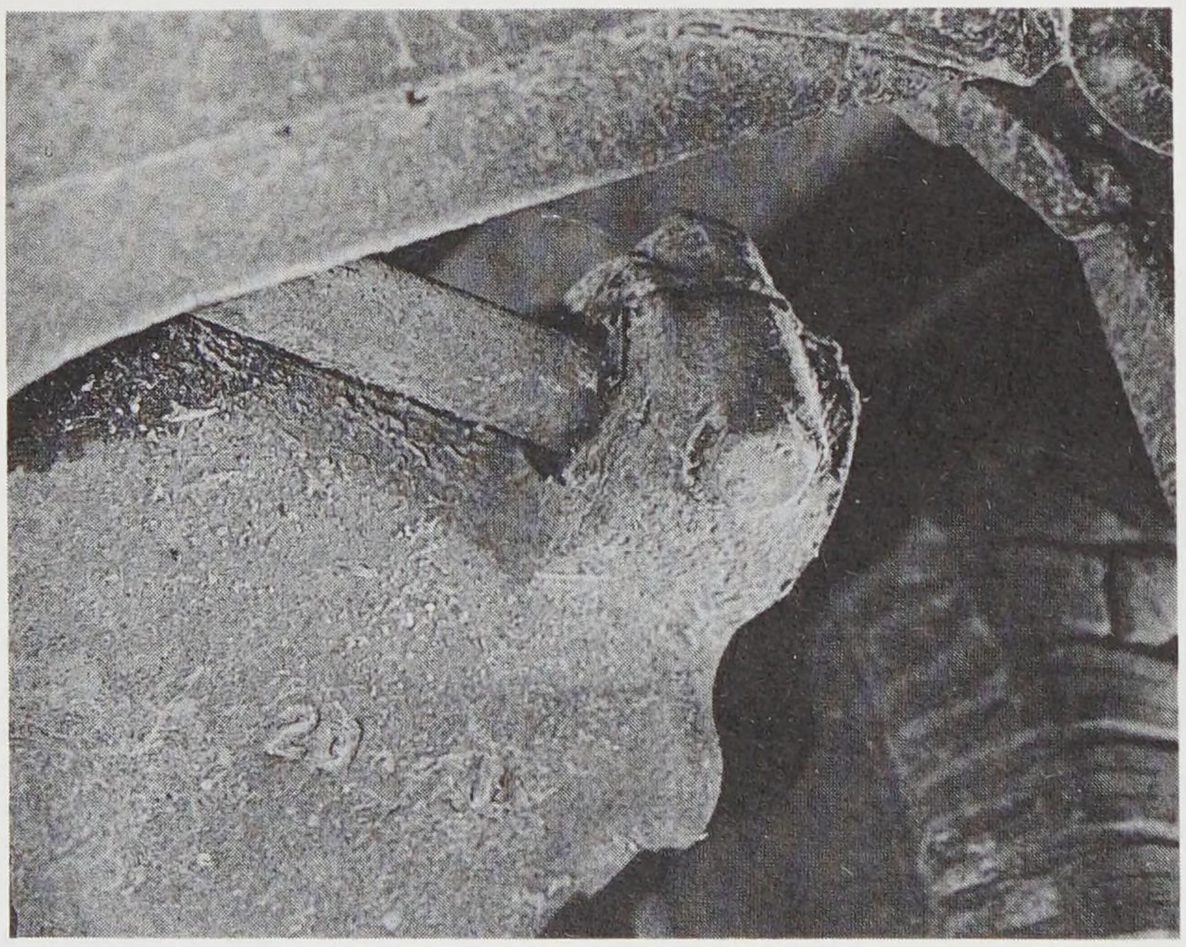


9.5B Front subframe rear mounting bolt

2 Remove the steering rack as described in Chapter 10.
3 Remove the engine rear mounting.
4 Disconnect or unbolt any cable ties/pipe brackets secured to the subframe.
5 Support the subframe on blocks, then remove the subframe mounting bolts (photos). Withdraw the subframe from under the vehicle.
6 Refitting is a reversal of removal, taking note of the following.
7 From approximately November 1988, improved rear mounting bolts were introduced. These bolts incorporate a captive washer, in place of the belville washer used on earlier bolts. If these belville washers are found cracked, or a problem knock from the front suspension has been evident, the later bolts should be fitted.
8 Apply thread-locking compound to the bolt threads and tighten them to their specified torque.
9 If plastic protection plugs are fitted over the rear mounting nuts, refit the plugs on completion.

10 Rear anti-roll bar – removal and refitting

1 Raise the rear of the vehicle onto axle stands and remove the rear wheels.
2 On early models, remove the screw and washer from each end of the anti-roll bar and loosen the clamp bolts.



10.3 Anti-roll bar cotter bolt on later models

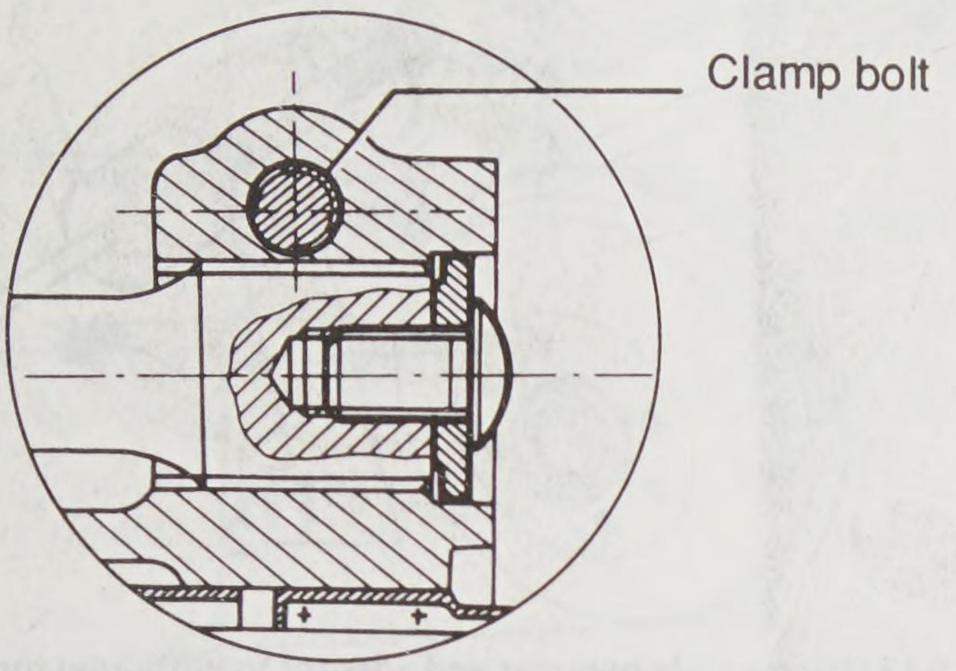
3 On later types, remove the cotter bolt from each end of the anti-roll bar (photo).
4 Using a drift, knock the anti-roll bar from the trailing arms working from left to right.
5 Clean both ends of the anti-roll bar and the housings in the trailing arms. Coat the splines of the bar with Esso Norva 275 grease.
6 Insert the anti-roll bar through the right-hand trailing arm and through into the left-hand arm, rotating the bar to find which position the splines will fit into most easily.
7 Use the drift to centralise the bar in the trailing arms.
8 Fit the screws and thrustwashers to the ends of the bar on early models and tighten them to their specified torque. Oil the clamp bolt then fit the bolt and tighten it to the specified torque.
9 On later models, oil the cotter bolt then fit and tighten it to the specified torque.
Note: *Due to the changes in the anti-roll bar mountings a problem will arise if either of the trailing arms are renewed on earlier models. To overcome this, special fitting kits are available from Peugeot dealers. When renewing a left-hand trailing arm, fit a new thrustwasher and bolt to the left-hand end of the anti-roll bar. Also fit a new clamp bolt. If the right-hand clamp bolt has been loosened it too must be renewed.*
When renewing the right-hand trailing arm, the anti-roll bar must also be renewed, which will include a new cotter bolt. The left-hand clamp bolt must also be renewed. Tightening torques for the repair bolts remain the same.

11 Rear shock absorber – removal and refitting

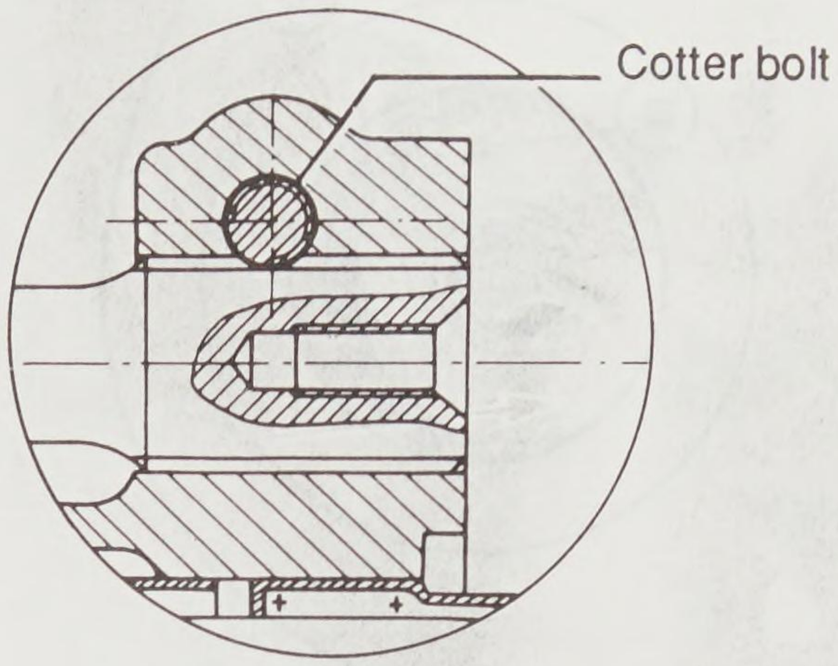
1 Position the rear of the vehicle onto ramps. Do not allow the trailing arms to hang unsupported.
2 Undo the nuts on the shock absorber top and bottom mounting bolts (photos).
3 Tap the bolts out of the mountings to free the shock absorber and withdraw the unit from the vehicle.
4 Fit the shock absorber in reverse order but do not tighten the bolts yet.
5 The distance between the bolt centres must be set to 328.0 mm (12.9 in) before the bolts are finally tightened to their specified torque. This can be achieved by loading the vehicle until this dimension is achieved. Finally, tighten the bolts.

12 Rear suspension torsion bars – removal and refitting

1 Raise the vehicle onto axle stands and remove the rear wheels.
2 Remove the anti-roll bar as described in Section 10.
3 Remove the shock absorber on the side to be worked on as described in Section 11, but first support the trailing arm on a jack.



1



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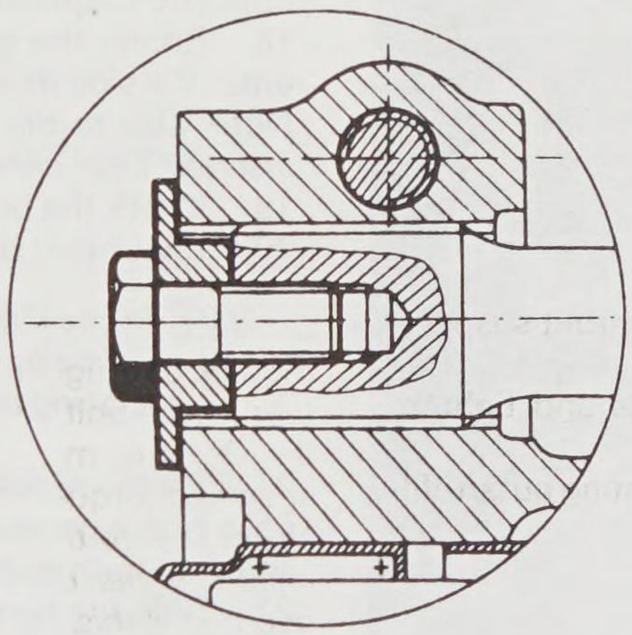


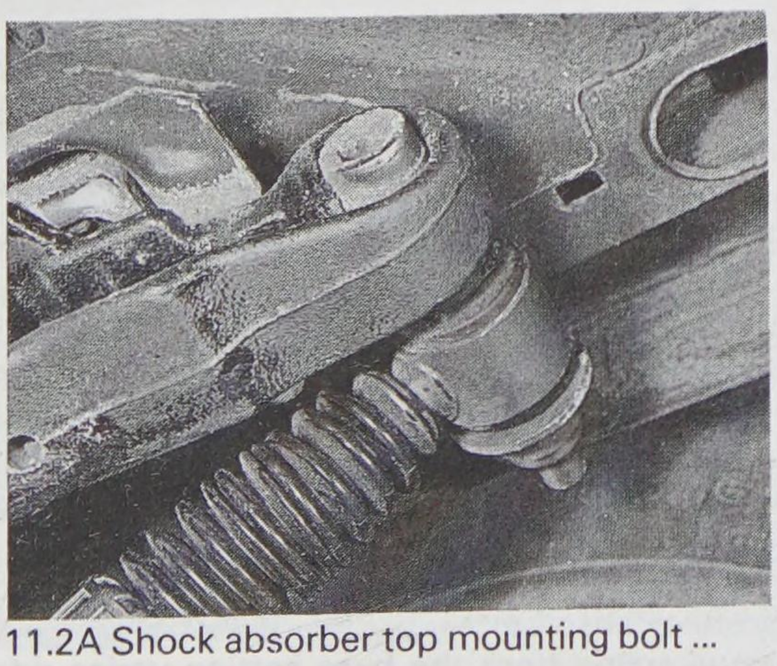
3

Fig 9.11 Differing rear anti-roll bar mounting arrangements (Sec 10)

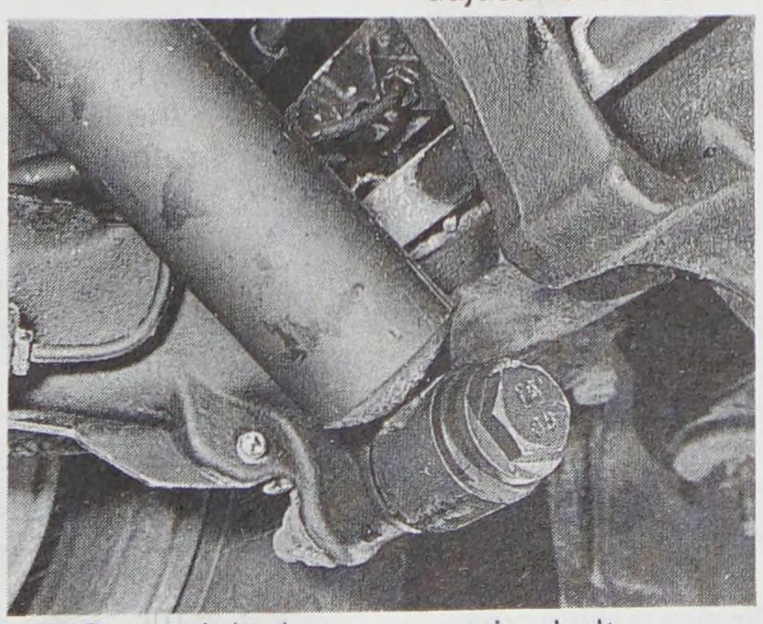
1 Early configuration at each end of bar
2 Later type at right-hand end only
3 Special bolt and repair washer

4 Fit a dummy shock absorber (Peugeot tool 0908 V), adjusting its length to fit easily over the shock absorber bolts. If necessary, raise the trailing arm on a jack slightly to achieve the fit.

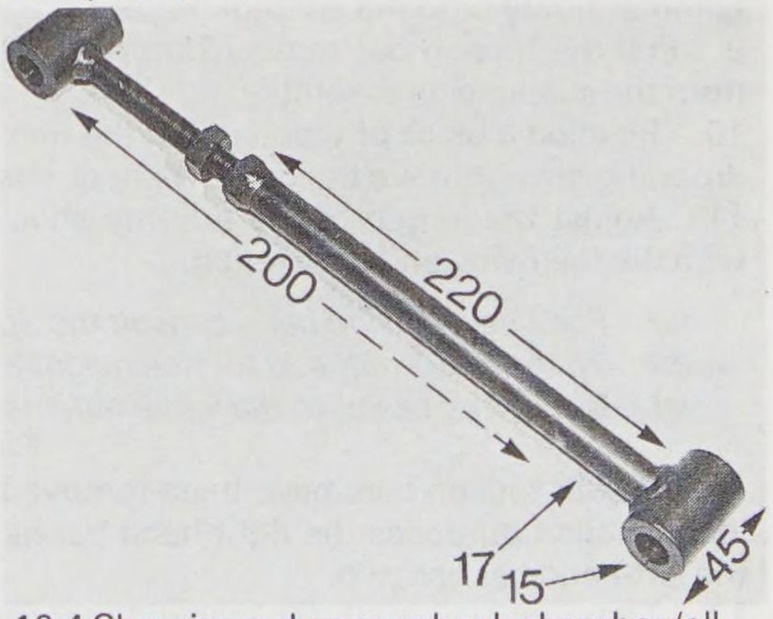
Note: *If the dummy shock absorber is unavailable, a similar tool could be made up using suitable lengths of tubing to the dimensions given in the photograph. The pitch of the thread must be 1.5 mm to allow for accurate adjustment of the suspension (photo).*



11.2A Shock absorber top mounting bolt ...



11.2B ... and the lower mounting bolt



12.4 Showing a dummy shock absorber (all dimensions in mm)

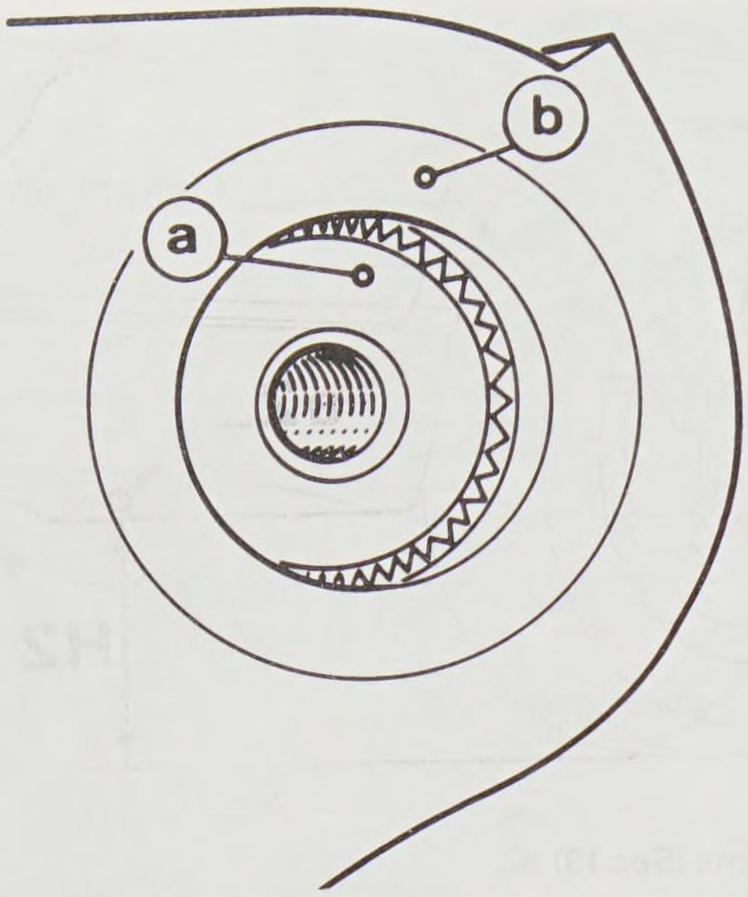
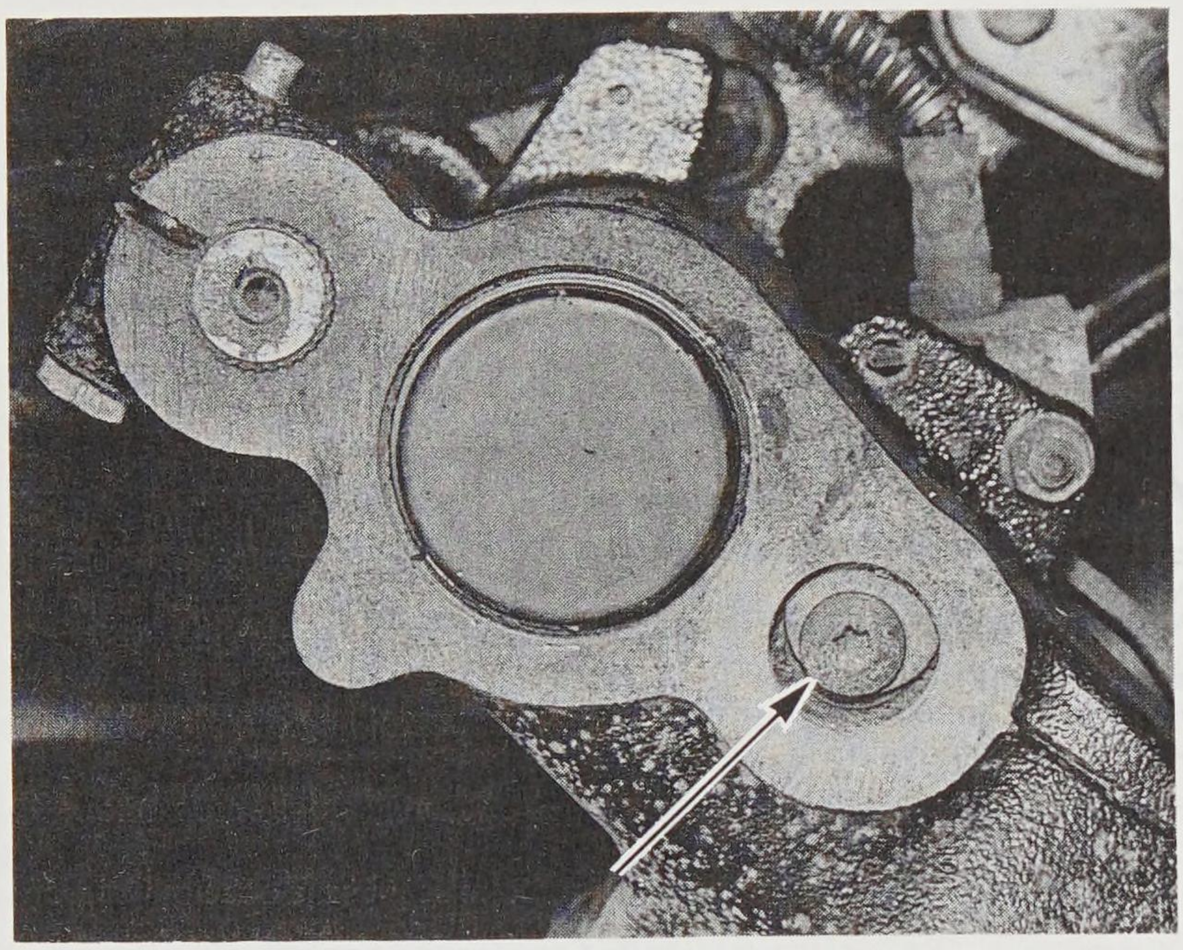


Fig 9.12 Centre punch marks on torsion bar (a) and trailing arm (b) (Sec 12)



12.5 Screw and thrustwasher at end of torsion bar (arrowed)

5 Remove the screw and thrustwasher from each end of the torsion bar (photo).
6 Unbolt the handbrake cable support bracket from the trailing arm.
7 Using a centre punch, mark the relationship of the torsion bar to the trailing arm (Fig. 9.12).
8 Fit a slide hammer adaptor (Peugeot tool 0908 Q or suitable alternative) to the trailing arm end of the torsion bar, then screw the slide hammer firmly onto the adaptor (Fig. 9.13).
9 Pull the torsion bar outward from the trailing arm and remove it from the suspension assembly.
10 Position a block of wood under the trailing arm to prevent it from dropping, then remove the dummy shock absorber.
11 Adjust the length of the dummy shock absorber in accordance with the following and then refit it.

(a) For a new torsion bar – consult the Specifications
(b) To the value required for ride height adjustment
(c) In all other cases, to the value obtained during removal

12 If both torsion bars have been removed do not mix them up. For identification purposes the right-hand bar has one paint ring on it and the left-hand bar has two.
13 Thoroughly clean the splines of the torsion bar and trailing arm.
14 Position the thrustwasher in its groove in the torsion bar location in the suspension side member.
15 Coat the splines of the bar with Esso Norva 275 grease.

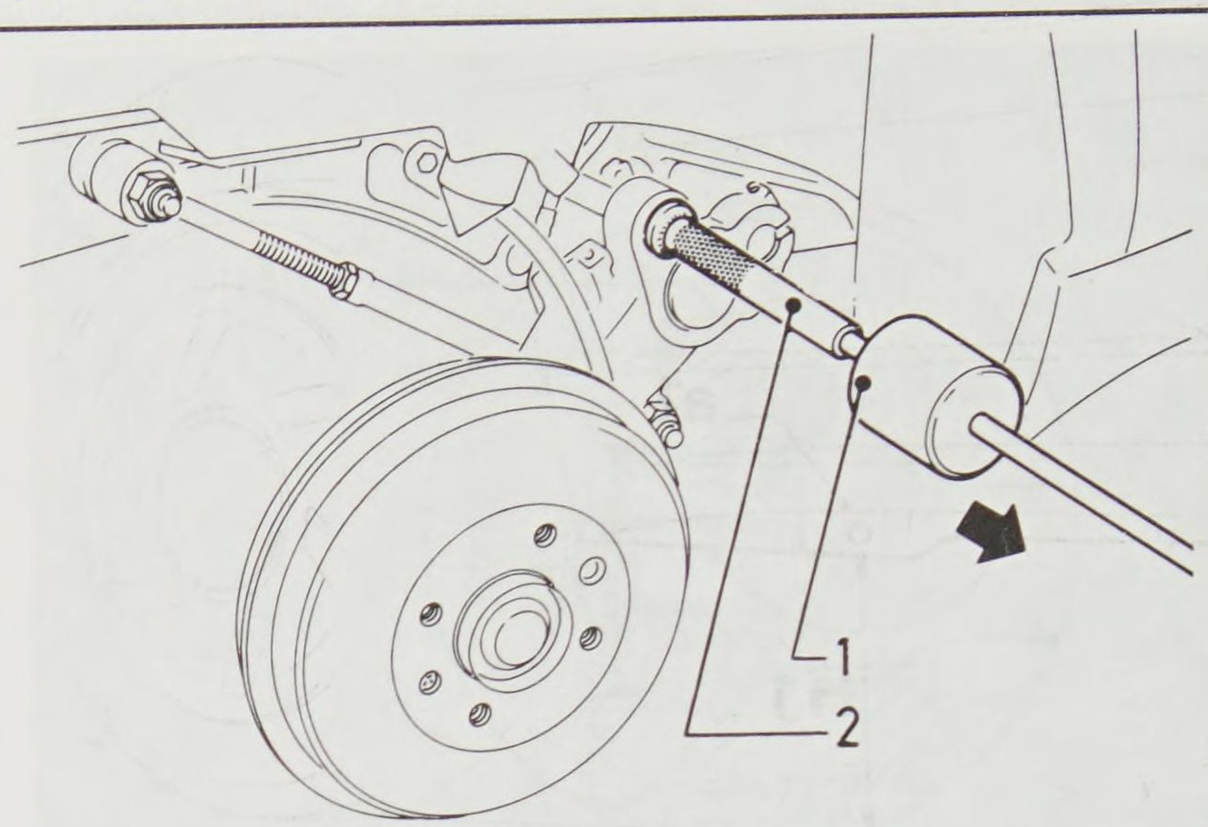


Fig 9.13 Using a slide hammer and adaptor to withdraw torsion bar (Sec 12)

1 Slide hammer 2 Adaptor

16 Screw the adaptor tightly into the larger diameter end of the torsion bar, then fit the slide hammer to the adaptor.
17 Insert the bar all the way through the trailing arm and into the opposite suspension side member.
18 Rotate the bar spline by spline to find the position where it will enter the side member freely by about 8 to 10 mm.
Note: *Due to the even number of splines (30 and 32), the bar can be inserted 180° either way without altering ride height.*
19 Knock the bar fully home against the thrustwasher.
20 Check that the marks made during removal are:

(a) In line if ride height is not being adjusted, or
(b) Offset by the pre-determined number of splines if the ride height is being adjusted (see Section 13)

21 Fill the recess around the torsion bar end in the trailing arm with Esso Norva grease, then fit the thrustwasher. Tighten the thrustwasher screw in both ends of the torsion bar.
22 Refit the handbrake cable bracket to the trailing arm.
23 Remove the dummy shock absorber and refit the shock absorber as described in Section 11.
24 Refit the anti-roll bar as described in Section 10.
25 Fit the roadwheels and lower the vehicle to the ground.
26 Check ride height and adjust as necessary with reference to Section 13.

13 Rear suspension ride height – adjustment

1 Ride height must be measured with the vehicle in the following condition:

(a) All fluid systems full, vehicle unladen
(b) Tyres inflated to the correct pressure
(c) Vehicle standing on a firm level surface

2 Rock the vehicle to settle the suspension.
3 Measure H1 and H2 (see Fig. 9.14), taking three readings on each side, rocking the vehicle between each and use the average of the three.
4 The values obtained must be in accordance with the ride height dimensions, according to model, as given in the Specifications, and the difference between each side must not exceed 10.0 mm (0.394 in).
5 Adjustment is based on the number of splines at the suspension side member end of the torsion bar being thirty and those at the trailing arm end being thirty-two.
6 Adjustment is made by rotating the bar while the trailing arm is held stationary by the dummy shock absorber.
7 Rotating the bar by one spline from the base setting varies ride height by approximately 3.0 mm, which is achieved by also altering the length of the dummy shock absorber.

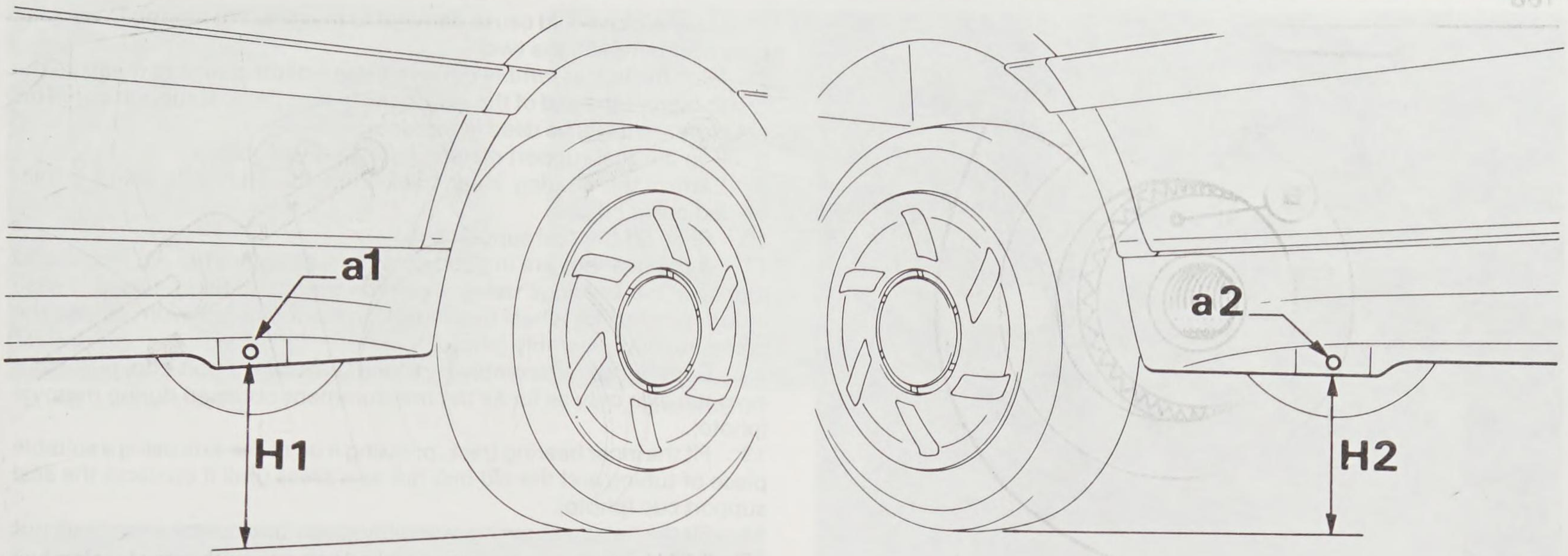


Fig 9.14 Ride height measurement points (Sec 13)

a1, a2 Left-hand and right-hand ride height measuring points
H1, H2 Left-hand and right-hand ride height dimension

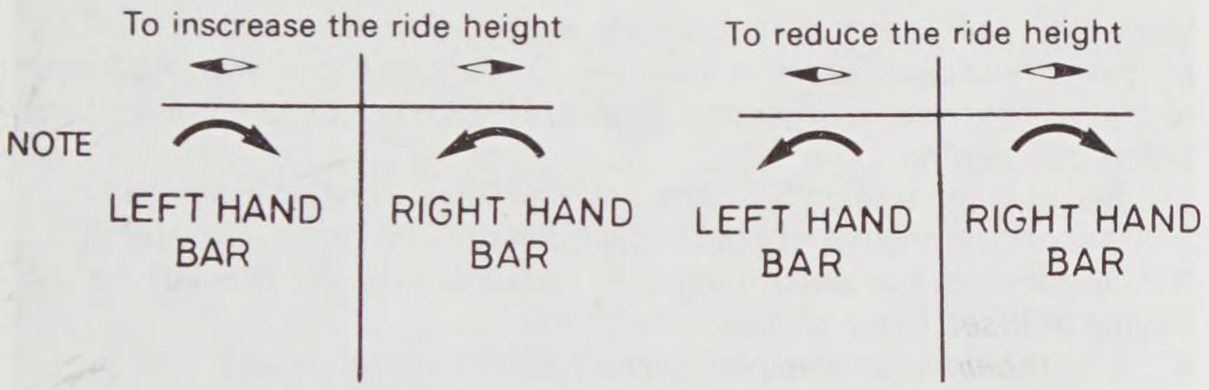


Fig 9.15 Torsion bar rotation for ride height correction (Sec 13)

Note: *Thread pitch of the dummy shock absorber is 1.5 mm, allowing length adjustment of 0.75 mm at a time. Adjusting one side of the suspension will also alter the height of the opposite side (see also Section 12).*

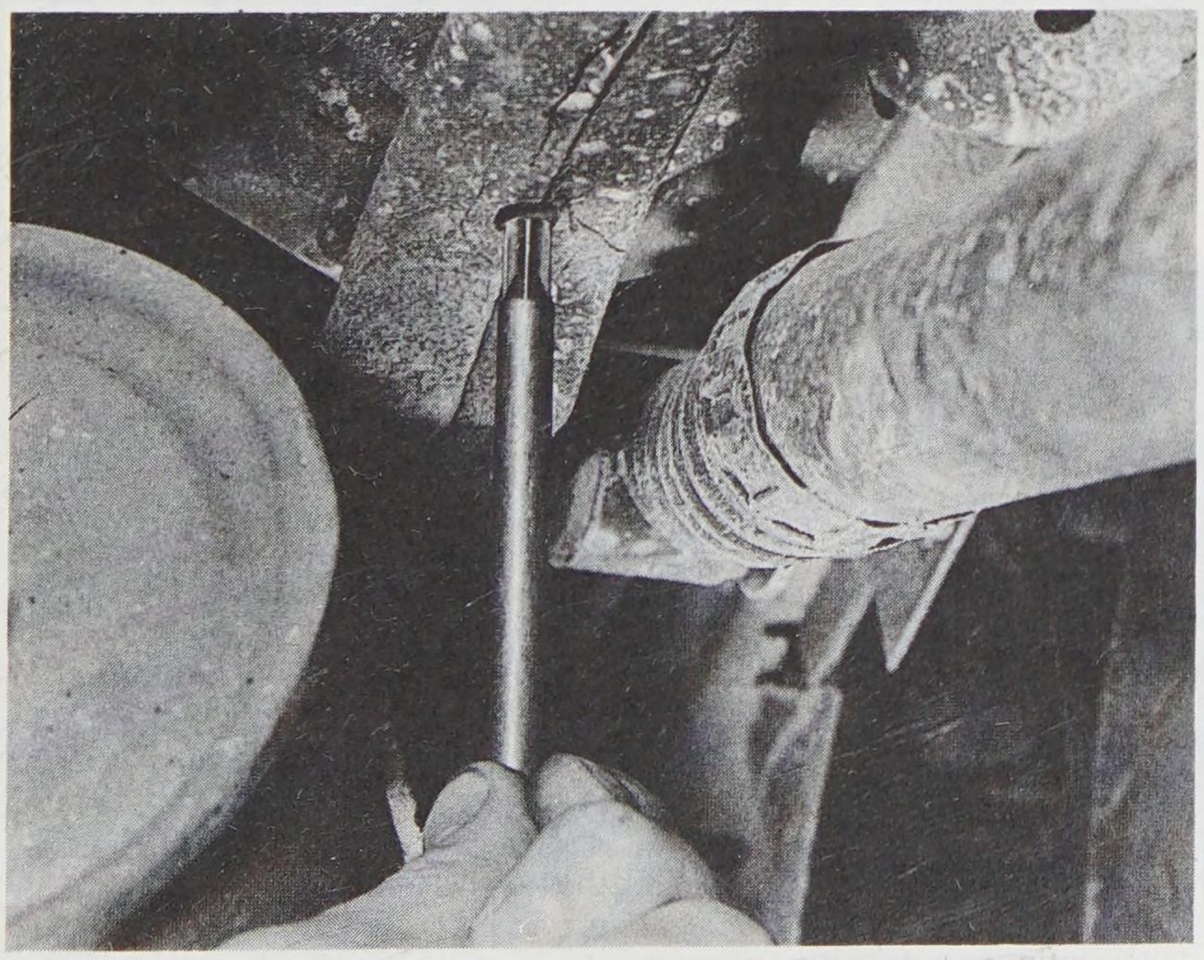
8 Mark the relative position of the torsion bar to the trailing arm, then remove the torsion bar, as described in Section 12.

9 To increase or reduce the ride height by 3.0 mm, or multiples thereof, increase or reduce the length of the dummy shock absorber by 1.5 mm or multiples thereof.

10 Refit the torsion bar, moving the previously made mark on the torsion bar away from the mark on the trailing arm by the desired number of splines in the required direction (see Fig. 9.15).

11 Lower the vehicle to the ground and recheck the ride height.

12 Carry out further adjustment as necessary, completing torsion bar refitting when the ride height is correct.



14.14 Splined adaptor for removing suspension assembly rear bolts

14 Rear suspension assembly – removal and refitting

Warning: *The following procedure entails the disconnection of the hydraulic fluid pipes to the rear brakes. On cars equipped with ABS, refer to the warning note in Chapter 8, Section 26 and consider the implications before proceeding.*

1 Raise the rear of the vehicle onto axle stands until the trailing arms are at maximum extension with the wheels still on the ground.

2 Remove the rear and intermediate sections of the exhaust pipe (Chapter 3).

3 Drain the fuel tank (Chapter 3).

4 Where fitted, remove the rear underfloor tray.

5 Disconnect and remove the fuel filler pipe connection to the fuel tank.

6 Unbolt and remove the exhaust heatshield.

7 Release the handbrake cables from the equaliser bracket, then unbolt and remove the bracket.

8 Unclip and remove the handbrake cables from the trailing arms and suspension assembly.

9 Loosen the fuel tank support strap bolts as far as is possible without removing them.

10 Disconnect and blank off the brake hydraulic pipes at the unions on the trailing arms.

11 On models with load-sensitive compensator valve, disconnect and blank off the hydraulic connections at the valve.

12 Where fitted, disconnect and unclip the ABS wheel sensor.

13 Support the suspension assembly cross-tube on a trolley jack.

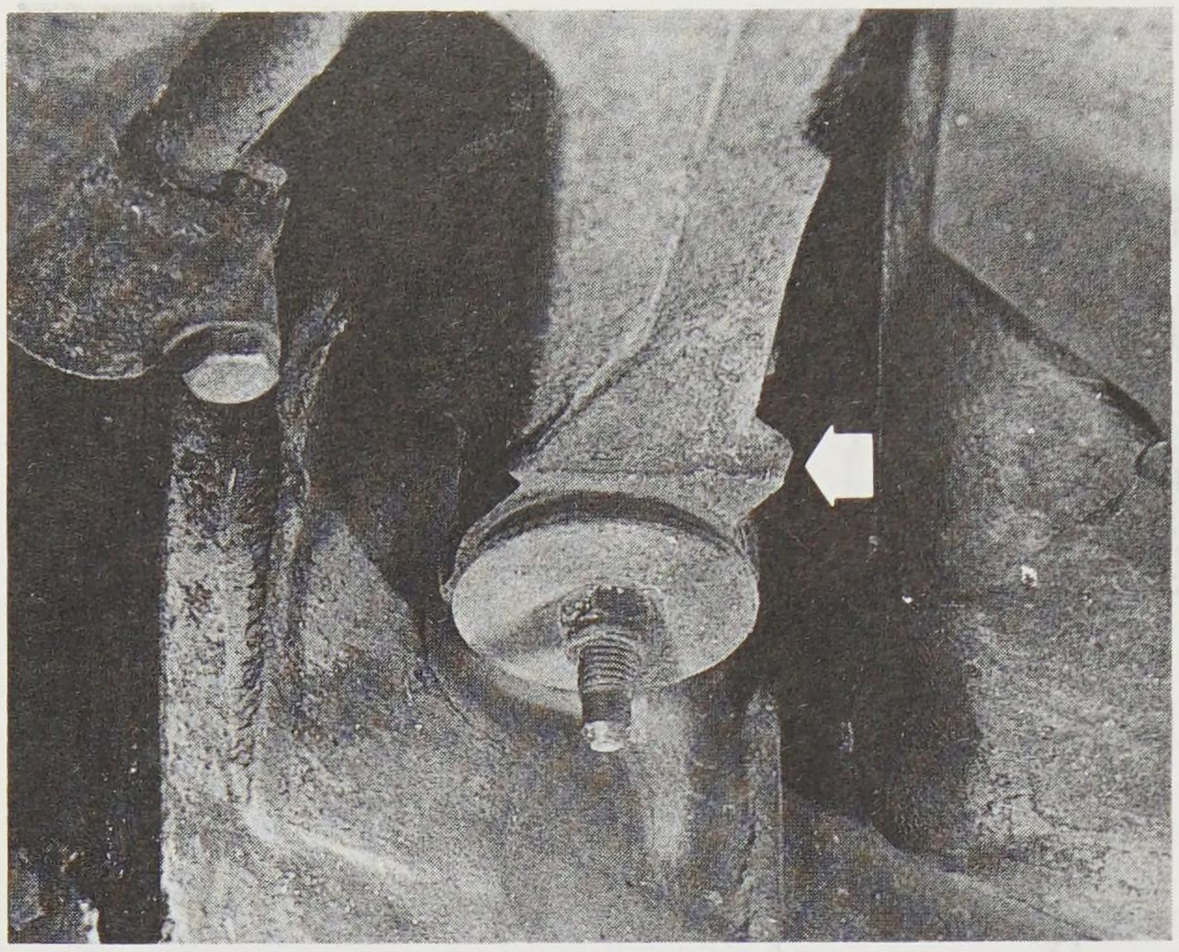
14 Using a long splined adaptor, unscrew the rear bolts securing the suspension assembly to the vehicle, accessible through the holes in the suspension assembly side members (photo).

15 Remove the two Torx bolts from each mounting (photo).

16 Lower the trolley jack and roll back the suspension assembly (raising the vehicle if necessary to clear the fuel tank), withdrawing the assembly clear of the vehicle.

17 Refitting is a reversal of removal, bearing in mind the following points:

(a) Tighten all bolts to their specified torque
(b) Bleed the brake system (Chapter 8)
(c) Check and adjust ride height (Section 13)



14.15 Front mounting torx bolts (arrowed)

15 Rear hub bearings – renewal

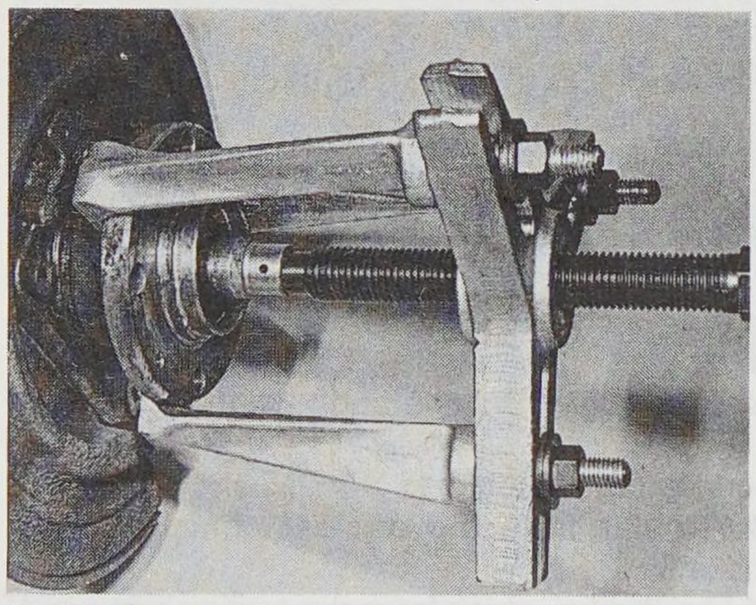
Note: *The rear hub bearings cannot be dismantled. If they become worn the complete hub assembly must be renewed.*

1 Raise the vehicle onto axle stands and remove the rear wheels.
2 Remove the brake drum or disc as described in Chapter 8.
3 Where fitted, remove and tie back the ABS wheel sensor (Chapter 8).
4 Prise out the centre cap from the hub.
5 Relieve the staking and undo the hub nut. Remove the nut and washer.
6 Use a puller to remove the hub and bearing assembly (photo). Do not allow the centre bolt of the puller to act directly on the end of the stub axle which could cause damage to the axle, but interpose a socket or similar between the two.
7 With the hub assembly removed, use a depth gauge to measure the distance from the end of the axle to the face of the seal support cup. This measurement will be used in reassembly.
8 Tap the seal support plate in as far as it will go.
9 Extract the bearing inner track from the stub axle using a thin-bladed puller (photo).
10 Prise off the seal support cap.
11 If the bearings are in good condition, clean out the old grease and lubricate the bearings using a general purpose lithium-based grease recommended for wheel bearings. If the bearings are worn, renew the complete hub assembly (photo).
12 Commence reassembly by fitting the seal support cup, pushing it onto the axle only as far as the measurement obtained during removal (photo).
13 Fit the inner bearing track, pressing it on to the axle using a suitable piece of tubing and the old hub nut as a press until it contacts the seal support cup (photo).
14 Fit the hub and bearing assembly, outer track, washer and hub nut (photos).
15 Tighten the hub nut to the specified torque, stake the nut to the stub axle, then fit the centre cap (photos).
16 The remaining procedure is the reverse of removal.

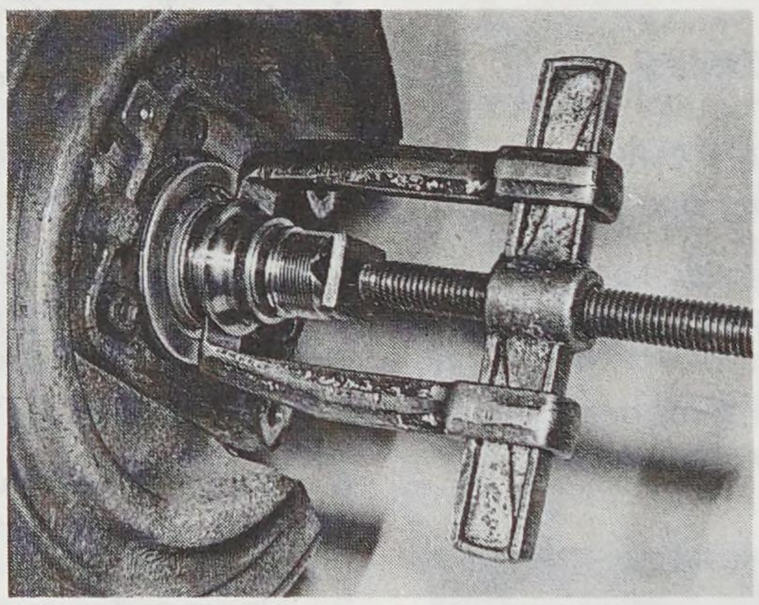
16 Rear suspension trailing arms and bearings – removal and refitting

Warning: *The following procedure entails the disconnection of the hydraulic fluid pipes to the rear brakes. On cars equipped with ABS refer to the warning note in Chapter 8, Section 26 and consider the implications before proceeding.*

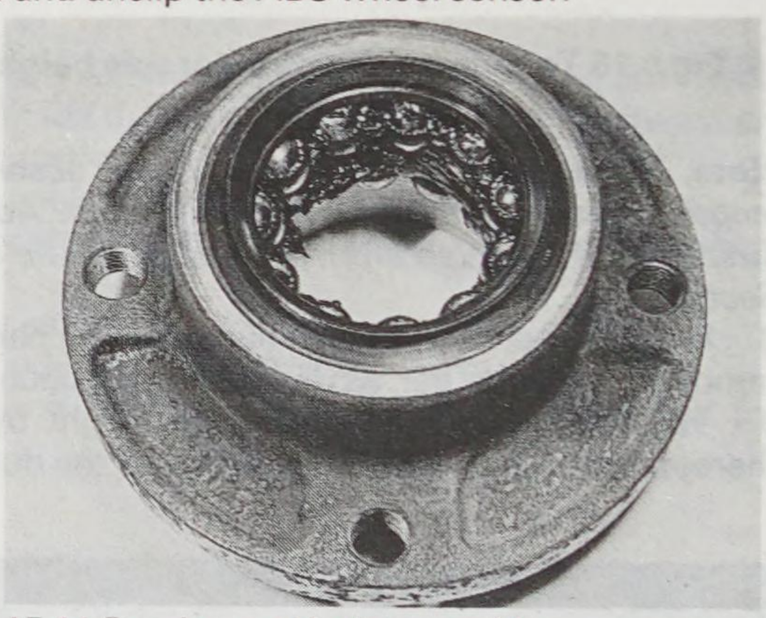
1 Remove the torsion bar on the side to be worked on (Section 12).
2 Disconnect the handbrake cable from the rear brake (Chapter 8).
3 Disconnect the brake hydraulic hose/pipe at the bracket on the trailing arm and blank off the hose/pipe ends.
4 Where fitted, remove and unclip the ABS wheel sensor.



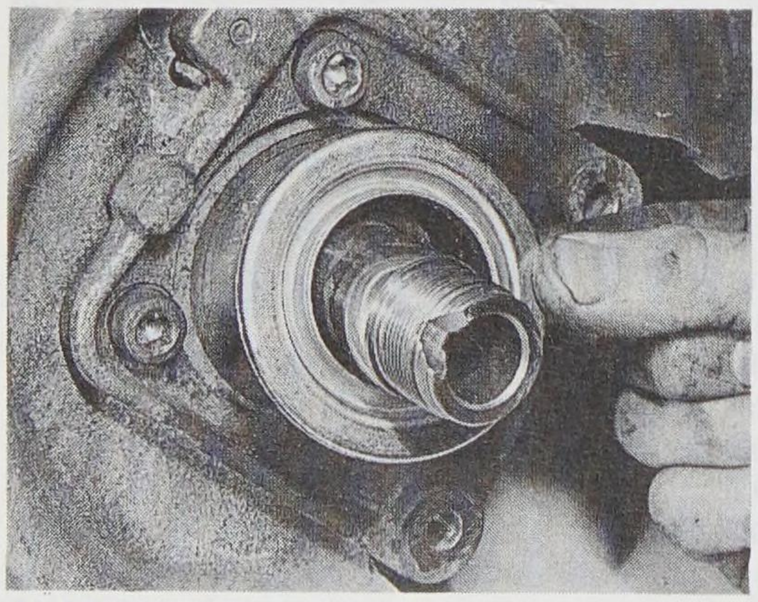
15.6 Using a puller to remove the hub and bearing assembly



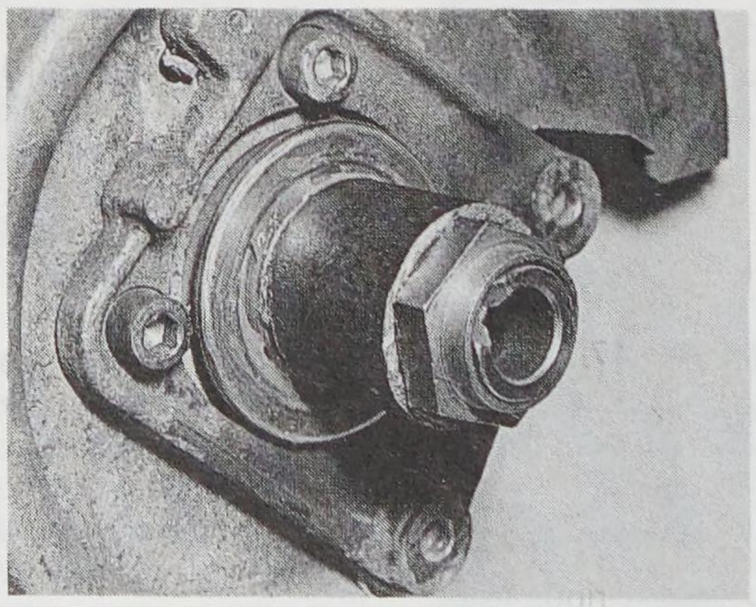
15.9 Extracting the bearing inner track



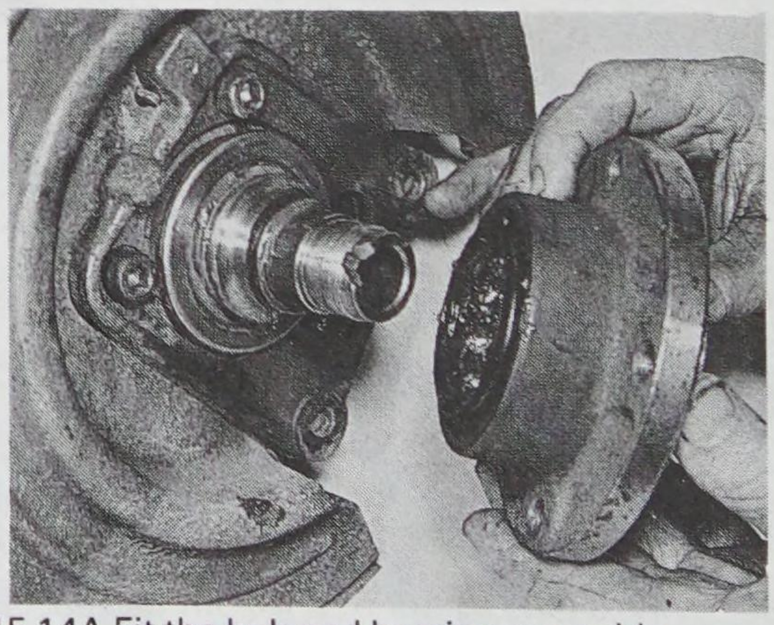
15.11 Bearing and hub assembly



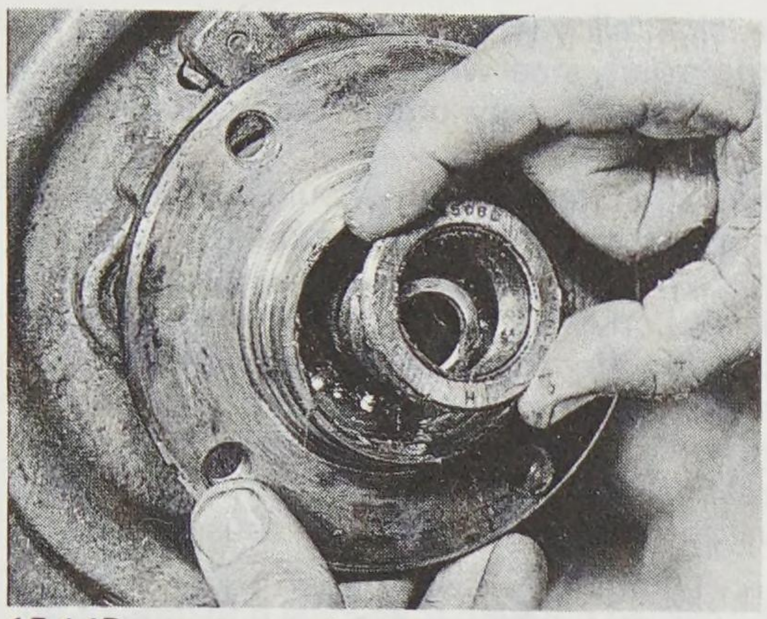
15.12 Fitting the seal support cup



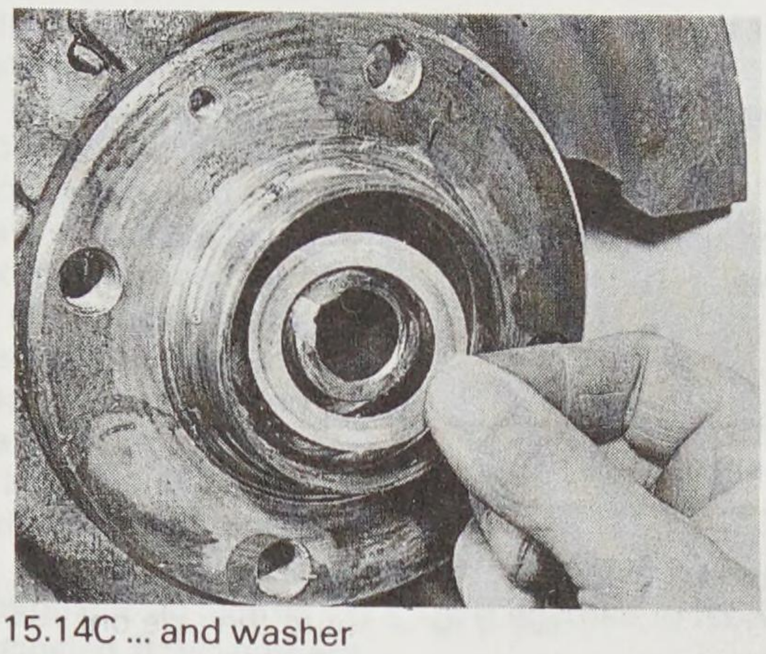
15.13 Pressing on the bearing inner track



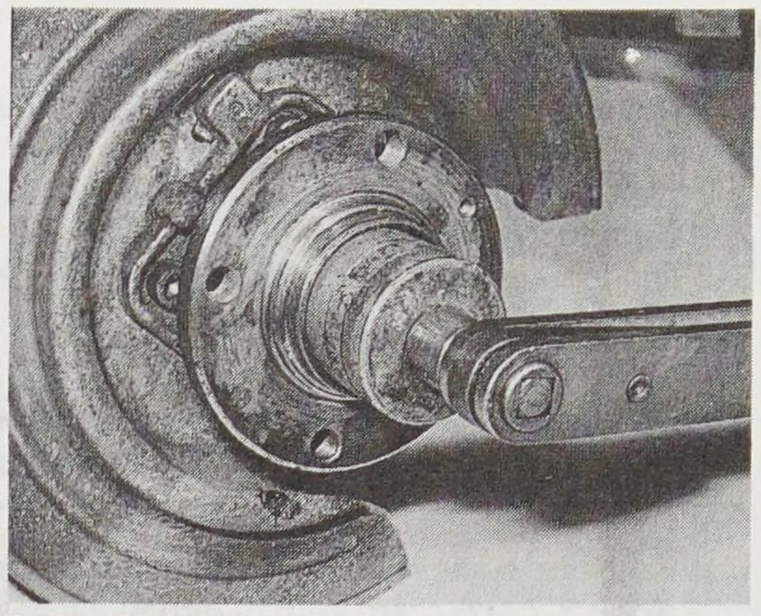
15.14A Fit the hub and bearing assembly ...



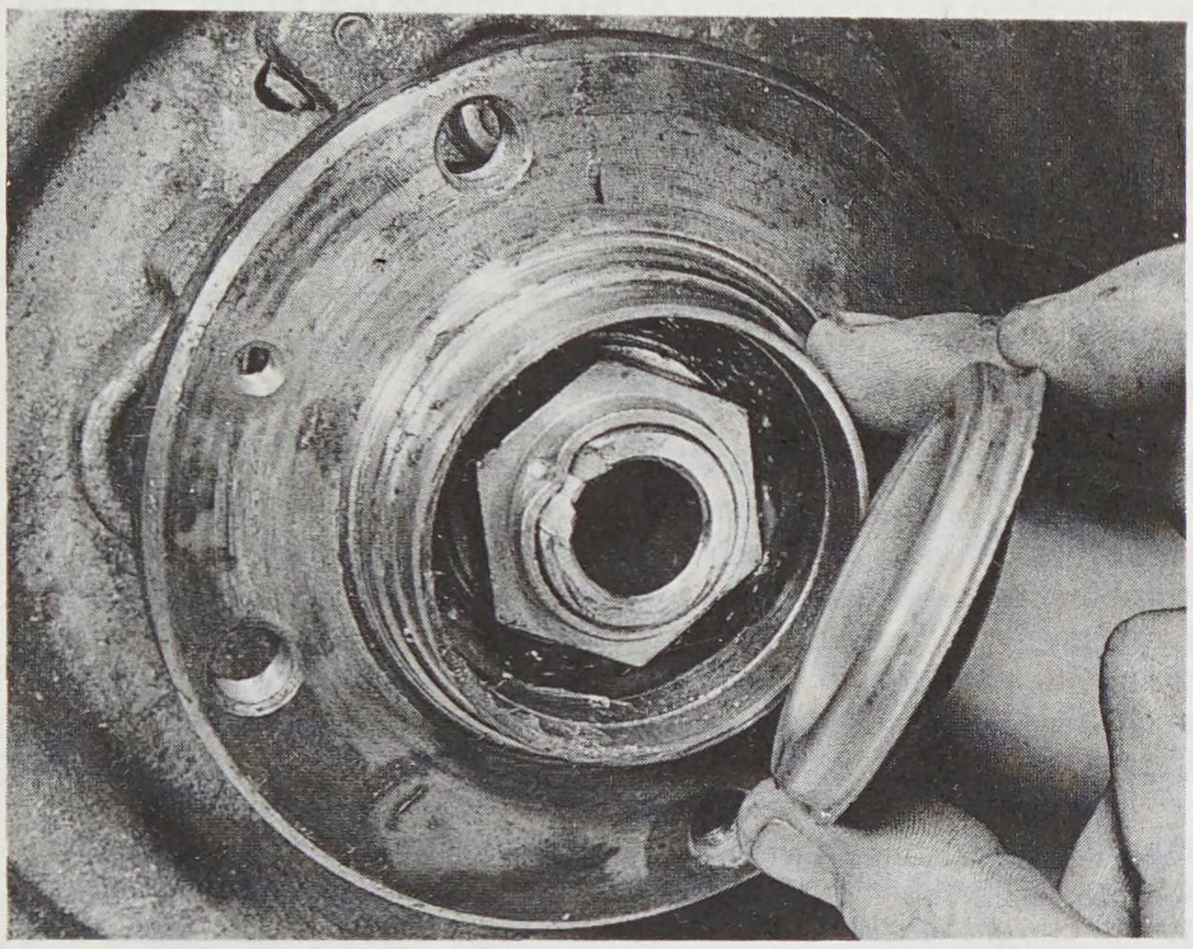
15.14B ... outer track ...



15.14C ... and washer



15.15A Tightening the hub nut



15.15B Fitting the centre cap (note the staking on the nut)

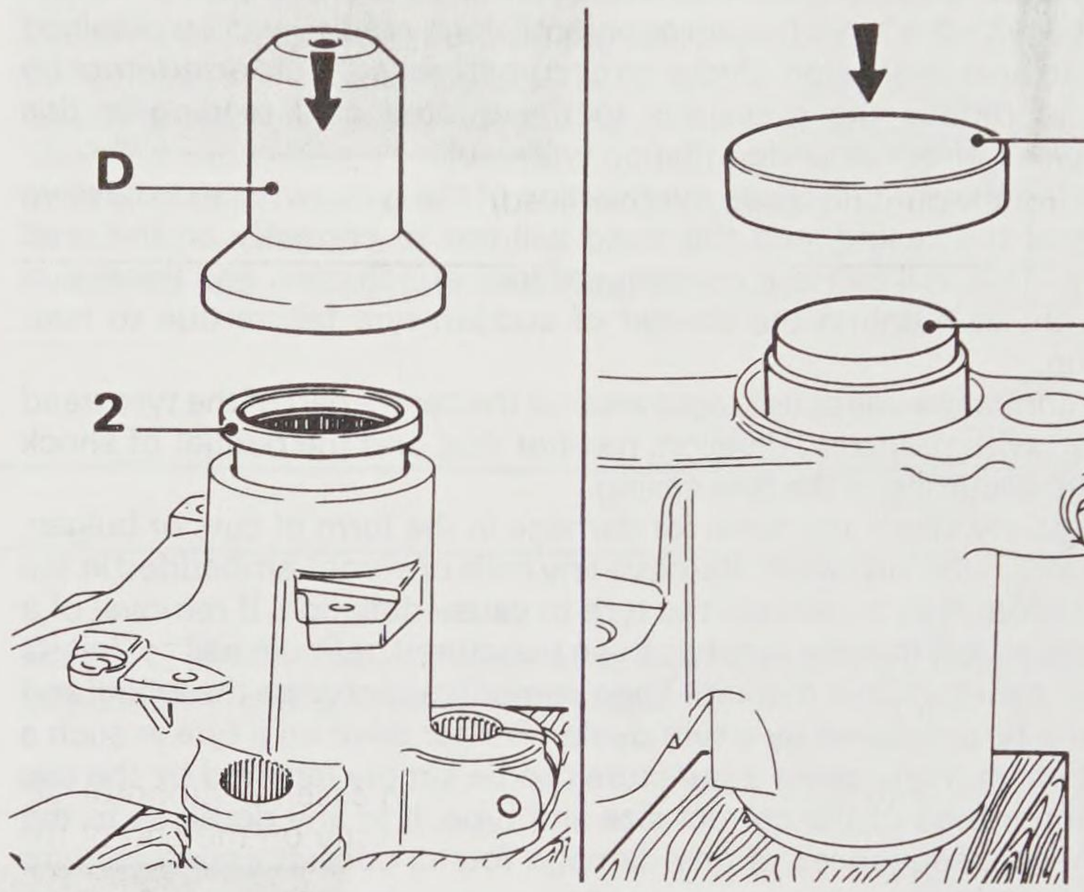


Fig 9.16 Pressing in trailing arm bearings using special mandrels (Sec 16)

D Tool 0530
F Tool 0530
1 Outer bearing
2 Inner bearing

7 Special mandrels are required to set the bearings to the correct depth in the trailing arm (Fig. 9.16). These tools will have to be obtained from a Peugeot dealer. Alternatively, take the arm to the dealer and have him fit the bearings.
8 Fit the inner bearing, pushing it in until the tool (0530 D) contacts the arm.
9 Fit the outer bearing using tool 0530 F until it, too, contacts the arm.
10 The remaining procedure is a reversal of removal.
11 On completion, check ride height as described in Section 13.
12 Bleed the brake hydraulic system and adjust the handbrake as described in Chapter 8.

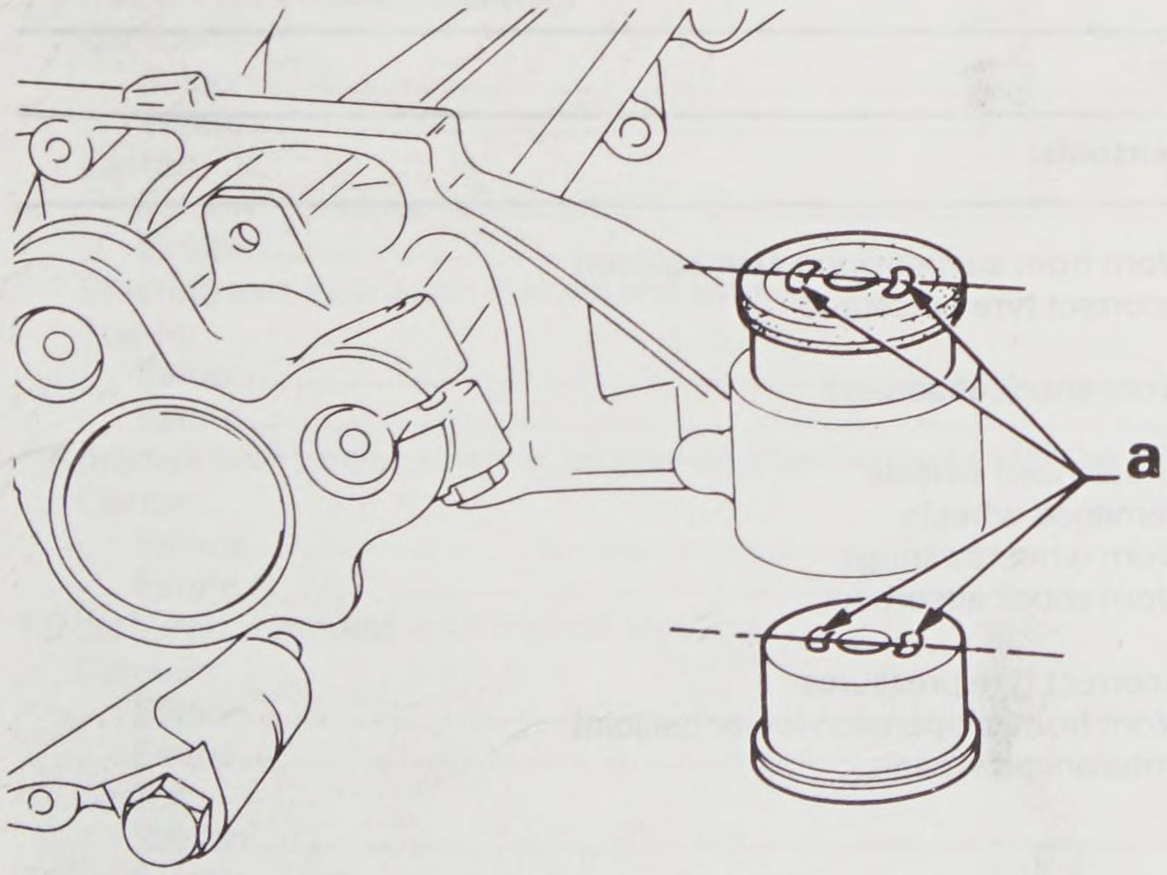


Fig 9.17 Alignment of rear suspension bush (Sec 17)

a Bush voids

5 Pull the trailing arm from the suspension cross-tube.
6 Using a long soft drift, drive out the inner and outer bearings from the trailing arm.
Note: *New bearings are lubricated with a special grease which will not mix with any other type. Do not attempt to re-grease them.*

17 Rear suspension bushes – renewal

1 Remove the suspension assembly as described in Section 14.
2 Remove the nut from the bush retaining bolt.
3 Tap out the bolt and recover the large bottom washer and top bracket.
4 Using a hacksaw, cut off the top and bottom flanges of the bush, being careful not to cut into the suspension frame.
5 Knock out the remaining parts of the bush.
6 Apply a little silicone lubricant to the new bush, then fit the top and bottom parts of the bush into the frame, ensuring the voids in the bushes lie along the longitudinal axis of the vehicle (Fig. 9.17).
7 Use a long bolt and large washers to draw the bushes fully into the frame.
8 Fit the top bracket, then lower the bolt through the bracket and bushes.

9 Fit the large and small washers to the lower bush, then screw on the nut. Do not fully tighten the nut at this stage.
10 The rear suspension pads are bolted to the suspension frame and can be renewed as a complete unit.
11 Refit the suspension assembly to the vehicle.
12 Tighten the suspension bush nut and bolt to the specified torque.
13 The remaining procedure is a reversal of removal.

18 Wheels and tyres – general care and maintenance

Wheels and tyres should give no real problems in use provided that a close eye is kept on them with regard to excessive wear or damage. To this end, the following points should be noted.

Ensure that tyre pressures are checked regularly and maintained correctly. Checking should be carried out with the tyres cold and not immediately after the vehicle has been in use. If the pressures are checked with the tyres hot, an apparently high reading will be obtained owing to heat expansion. Under no circumstances should an attempt be made to reduce the pressures to the quoted cold reading in this instance, or effective underinflation will result.

Underinflation will cause overheating of the tyre owing to excessive flexing of the casing, and the tread will not sit correctly on the road surface. This will cause a consequent loss of adhesion and excessive wear, not to mention the danger of sudden tyre failure due to heat build-up.

Overinflation will cause rapid wear of the centre part of the tyre tread coupled with reduced adhesion, harsher ride, and the danger of shock damage occurring in the tyre casing.

Regularly check the tyres for damage in the form of cuts or bulges, especially in the sidewalls. Remove any nails or stones embedded in the tread before they penetrate the tyre to cause deflation. If removal of a nail *does* reveal that the tyre has been punctured, refit the nail so that its point of penetration is marked. Then immediately change the wheel and have the tyre repaired by a tyre dealer. Do *not* drive on a tyre in such a condition. In many cases a puncture can be simply repaired by the use of an inner tube of the correct size and type. If in any doubt as to the possible consequences of any damage found, consult your local tyre dealer for advice.

Periodically remove the wheels and clean any dirt or mud from the inside and outside surfaces. Examine the wheel rims for signs of rusting, corrosion or other damage. Light alloy wheels are easily damaged by 'kerbing' whilst parking, and similarly steel wheels may become dented or buckled. Renewal of the wheel is very often the only course of remedial action possible.

The balance of each wheel and tyre assembly should be maintained to avoid excessive wear, not only to the tyres but also to the steering and suspension components. Wheel imbalance is normally signified by vibration through the vehicle's bodyshell, although in many cases it is particularly noticeable through the steering wheel. Conversely, it should be noted that wear or damage in suspension or steering components may cause excessive tyre wear. Out-of-round or out-of-true tyres, damaged wheels and wheel bearing wear/maladjustment also fall into this category. Balancing will not usually cure vibration caused by such wear.

Wheel balancing may be carried out with the wheel either on or off the vehicle. If balanced on the vehicle, ensure that the wheel-to-hub relationship is marked in some way prior to subsequent wheel removal so that it may be refitted in its original position.

General tyre wear is influenced to a large degree by driving style – harsh braking and acceleration or fast cornering will all produce more rapid tyre wear. Interchanging of tyres may result in more even wear, but this should only be carried out where there is no mix of tyre types on the vehicle. However, it is worth bearing in mind that if this is completely effective, the added expense of replacing a complete set of tyres simultaneously is incurred, which may prove financially restrictive for many owners.

Front tyres may wear unevenly as a result of wheel misalignment. The front wheels should always be correctly aligned according to the settings specified by the vehicle manufacturer.

Legal restrictions apply to the mixing of tyre types on a vehicle. Basically this means that a vehicle must not have tyres of differing construction on the same axle. Although it is not recommended to mix tyre types between front axle and rear axle, the only legally permissible combination is crossply at the front and radial at the rear. When mixing radial ply tyres, textile braced radials must always go on to the front axle, with steel braced radials at the rear. An obvious disadvantage of such mixing is the necessity to carry two spare tyres to avoid contravening the law in the event of a puncture.

In the UK, the Motor Vehicles Construction and Use Regulations apply to many aspects of tyre fitting and usage. It is suggested that a copy of these regulations is obtained from your local police if in doubt as to the current legal requirements with regard to tyre condition, minimum tread depth, etc.

19 Fault diagnosis – suspension, hubs, wheels and tyres

Symptom	Reason(s)
Cars pulls to one side	Worn front suspension lower balljoint Incorrect tyre pressures
Excessive pitching or rolling	Worn shock absorbers
Wheel wobble or vibration	Unbalanced wheels Damaged wheels Worn wheel bearings Worn shock absorbers
Excessive tyre wear	Incorrect tyre pressures Worn front suspension lower balljoint Unbalanced wheels

Chapter 10 Steering system

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Fault diagnosis – steering system 15
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Maintenance and inspection 2
Power-assisted steering fluid – draining, refilling and bleeding 3
Power-assisted steering hoses – general 13
Power-assisted steering pump – removal and refitting 12
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Steering gear – removal and refitting 7
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Track rod end – removal and refitting 9

Specifications

General

Type	Rack and pinion, manual or power-assisted according to model, tilt adjustable steering wheel on all models
Steering wheel turns lock-to-lock:	
Manual	4.1
Power-assisted	3.1
Turning circle	11.0 metres (36.0 ft)
Steering rack grease type	Meca-Graise BD 250 (Duckhams LBM 10)
Power steering fluid type	Dexron II ATF (Duckhams D-Matic)

Front wheel alignment

1.6 models with manual steering:	
Camber:	
Saloon	0° 13′ ± 30′
Estate	0° 10′ ± 30′
Castor:	
Saloon	1° 10′ ± 30′
Estate	0° 35′ ± 30′
Steering axis inclination (Saloon and Estate)	10° 40′ ± 30′
Toe-in:	
Saloon	3.5 ± 1.0 mm
Estate	3.3 ± 1.0 mm
1.6 models with power steering (as manual steering except for the following):	
Castor:	
Saloon	2° ± 30′
Estate	1° 25′ ± 30′
1.9 carburettor models with manual steering:	
Camber:	
Saloon	0° 13′ ± 30′
Estate	0° 10′ ± 30′
Castor:	
Saloon	1° 10′ ± 30′
Estate	0° 35′ ± 30′
Steering axis inclination (Saloon and Estate)	10° 40′ ± 30′
Toe-in:	
Saloon	3.5 ± 1.0 mm
Estate	3.3 ± 1.0 mm
1.9 carburettor models with power steering (as manual steering except for the following):	
Castor:	
Saloon	2° 30′ ± 30′
Estate	1° 25′ ± 30′
Toe-in (Saloon):	
Manual gearbox	3.5 ± 1.0 mm
Automatic transmission	4.0 ± 1.0 mm

1.9 fuel-injected models (excluding Mi 16):

Camber:	
Saloon	0° 13′ ± 30′
Estate	0° 10′ ± 30′
Castor:	
Saloon	2° 0′ ± 30′
Estate	0° 10′ ± 30′
Steering axis inclination (Saloon and Estate)	10° 40′ ± 30′
Toe-in:	
Saloon	3.5 ± 1.0 mm
Estate	3.3 ± 1.0 mm

Mi 16 models:

Camber	0° ± 30′
Castor	2° 20′ ± 30′
Steering axis inclination	11° 0′
Toe-in	3.0 ± 1.0 mm

Torque wrench settings

	Nm	lbf ft
Steering wheel nut	30	22
Universal joint clamp bolt	20	15
Rack-to-subframe bolts	40	35
Track rod balljoint nuts	35	26
Power steering high pressure hose-to-pump union	25	18
Power steering valve-to-rack nuts	12.5	9
Power steering valve-to-rack pipe unions	12.5	9
Track rod inner joint	50	37

1 General description

The steering system is of rack-and-pinion type, either manual or power-assisted depending on specification level. The steering rack is connected to the hub carrier by adjustable track rods, and balljoints.

The steering column incorporates a single universal joint at its lower end connected to an intermediate shaft, which in turn is connected to the steering rack pinion by another universal joint.

The top end of the steering column, and thus the steering wheel, is adjustable for rake.

The power steering pump on power-assisted versions is mounted on the engine and is driven by belt from the crankshaft pulley on all models except the Mi 16, where it is driven by belt from the exhaust camshaft.

2 Maintenance and inspection

At the intervals laid down in the 'Routine maintenance' *section at the beginning of this manual, carry out the following operations.*

1 On models with power-assisted steering, check the fluid level in the reservoir. The reservoir is mounted in the engine bay just in front of the left-hand suspension tower (photo).

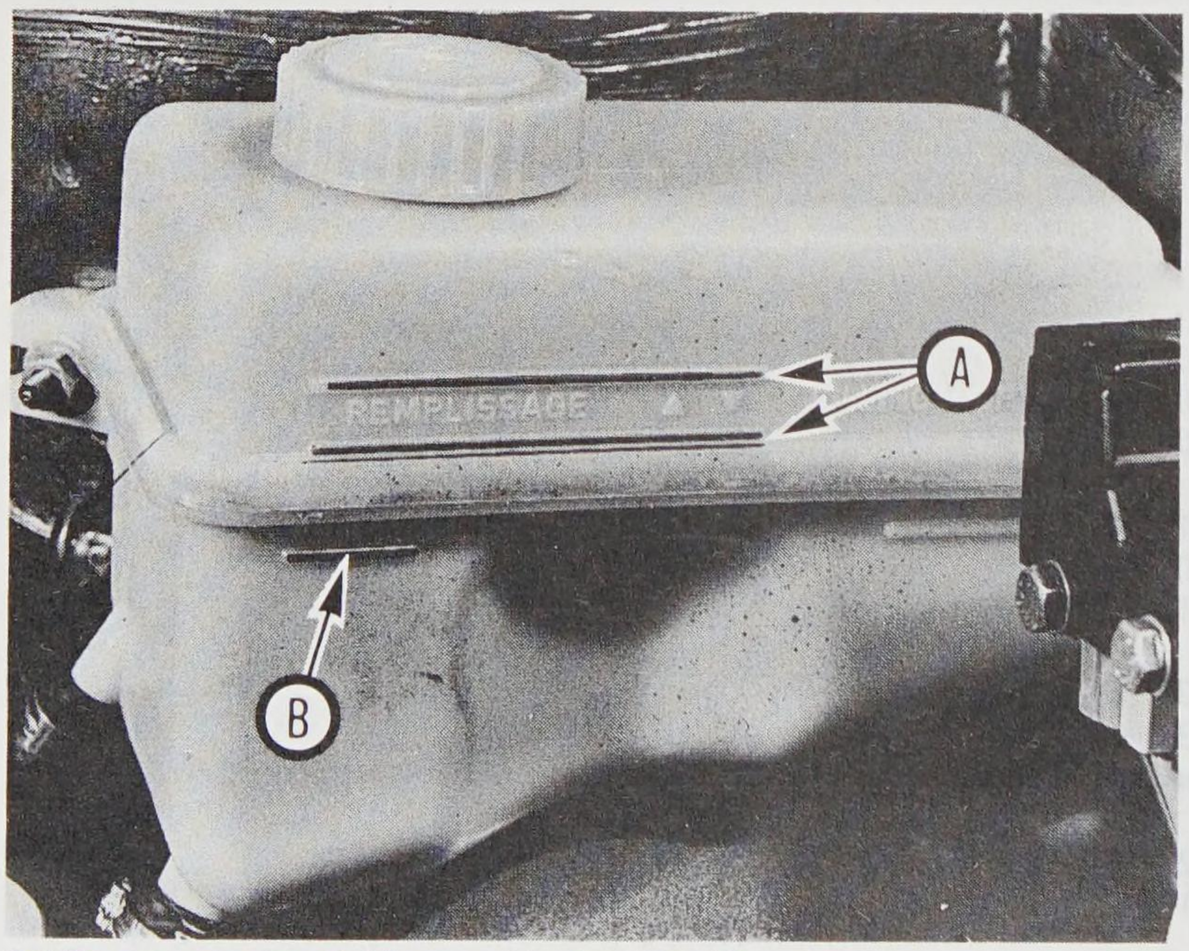
2 The fluid level must be checked with the wheels in the straight-ahead position (the fluid level changes with rack position), and must be maintained between the two upper marks on the side of the reservoir. It must never be allowed to fall below the minimum line.

3 If the level is low, remove the filler cap, and replenish the system with the specified fluid to the correct level (photo). Be careful not to spill any fluid onto the car paintwork and refit the reservoir cap on completion.

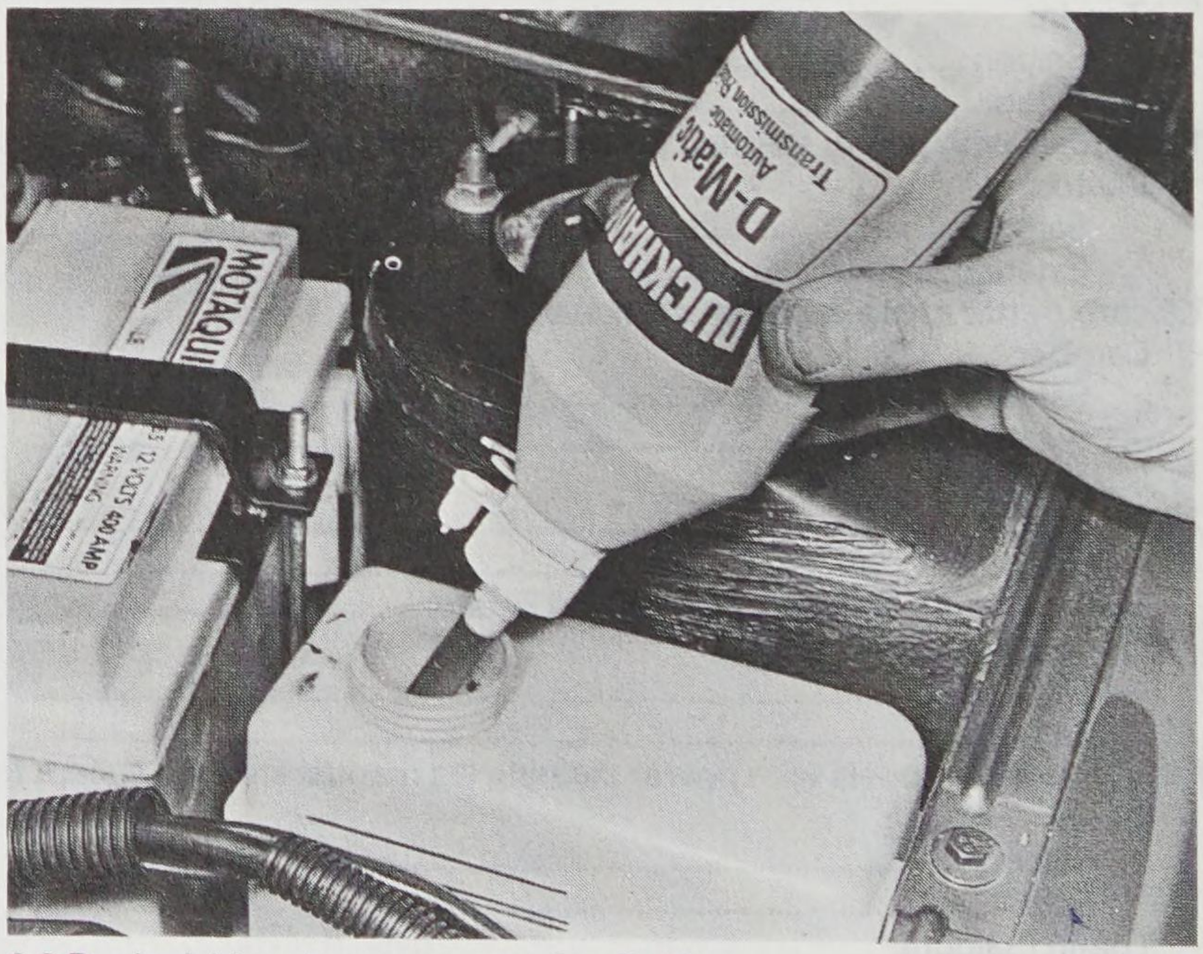
4 Check the condition of the power steering pump drivebelt. Renew the belt if it is showing signs of fraying, cracking or oil contamination. Also check the tension of the belt as described in Chapter 12, Section 2 for all models except Mi 16, and Section 12 of this Chapter for Mi 16 models.

5 On all versions, jack up the front of the car and support on axle stands. Apply the handbrake. Thoroughly examine the bellows at each end of the steering gear for splitting and deterioration, and renew if necessary.

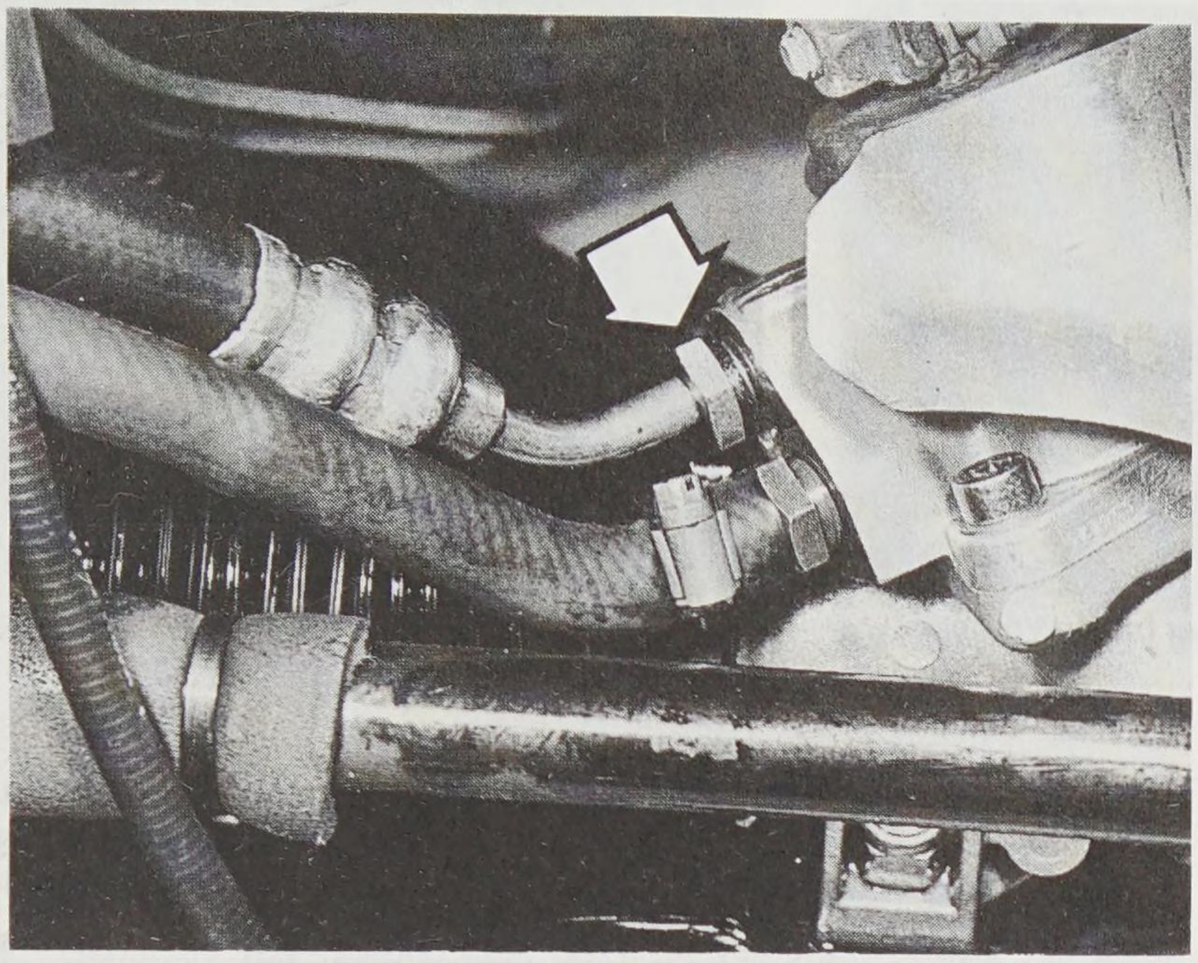
6 Check the track rod ends for excessive wear by attempting to move them up and down. If there is more than the very slightest movement



2.1 Power steering fluid reservoir showing (A) two upper marks and (B) lower mark



2.3 Replenishing the power steering fluid

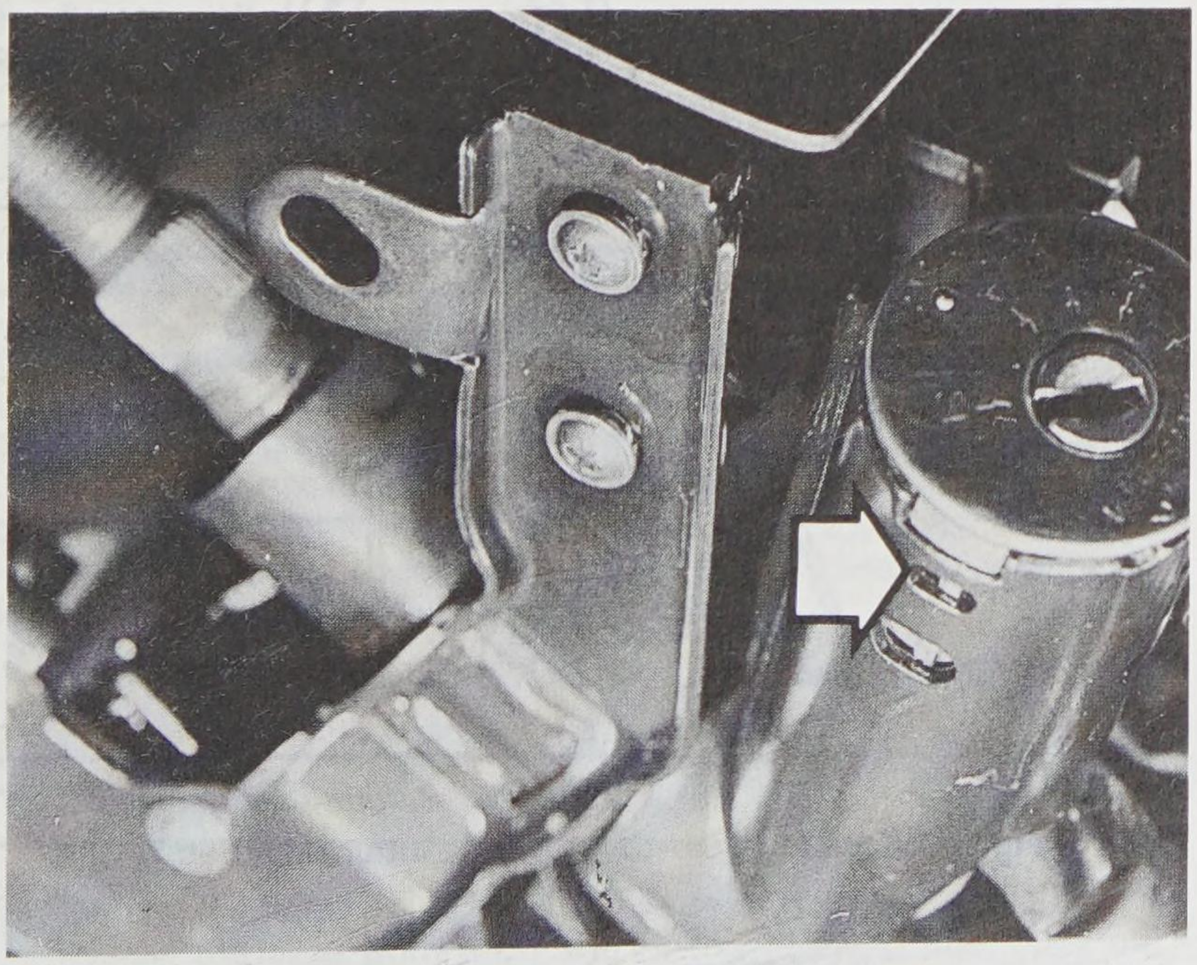


3.2 High pressure pipe union on steering rack valve (arrowed)

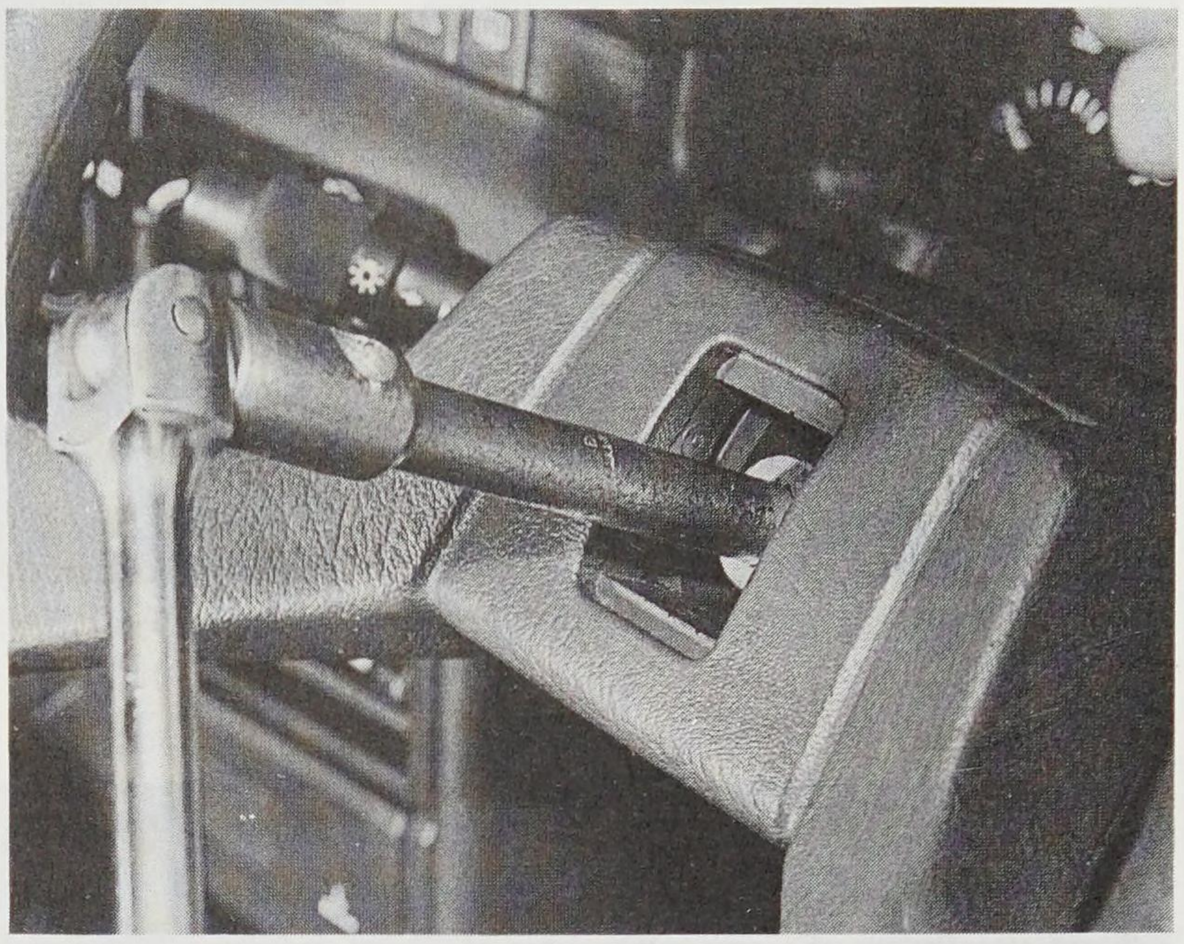
the track rod end should be renewed. Similarly check the track rod inner joints by gripping the track rod through the bellows and attempting to move them up and down. Track rod ends should also be renewed if the rubber boots are split or damaged.

3 Power-assisted steering fluid – draining, refilling and bleeding

1 Remove the filler cap from the reservoir.
2 Have ready a suitable container for catching the fluid, then undo the high pressure pipeline union on the rack valve (photo) and allow the fluid to drain into the container.
3 Turn the steering slowly from lock-to-lock several times to completely empty the system.
4 On completion, reconnect the high pressure pipeline to the valve.
5 Fill the reservoir with the specified fluid.
6 Turn the steering slowly from lock-to-lock several times, filling the system each time the level falls, until the level is approximately full.
7 Start the engine and continue to turn the steering from lock-to-lock, checking the reservoir level and topping-up as the level falls.
8 When no more air bubbles can be seen issuing from the return outlet in the reservoir, stop the engine, turn the wheel to the straight-ahead position and check and top up the reservoir. Refit the cap on completion.



5.4A Lock retaining plunger (arrowed) ...



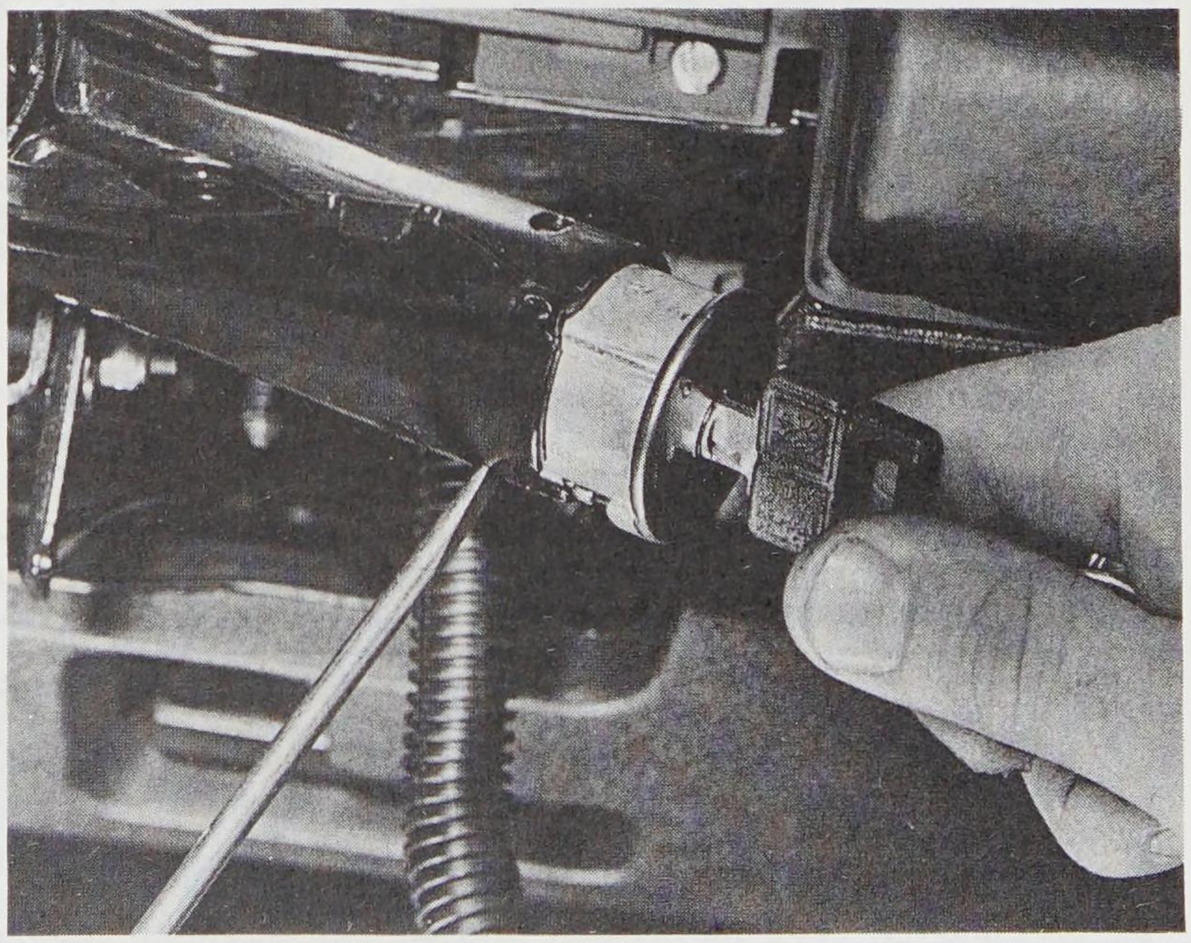
4.4 Undoing the steering wheel nut

4 Steering wheel – removal and refitting

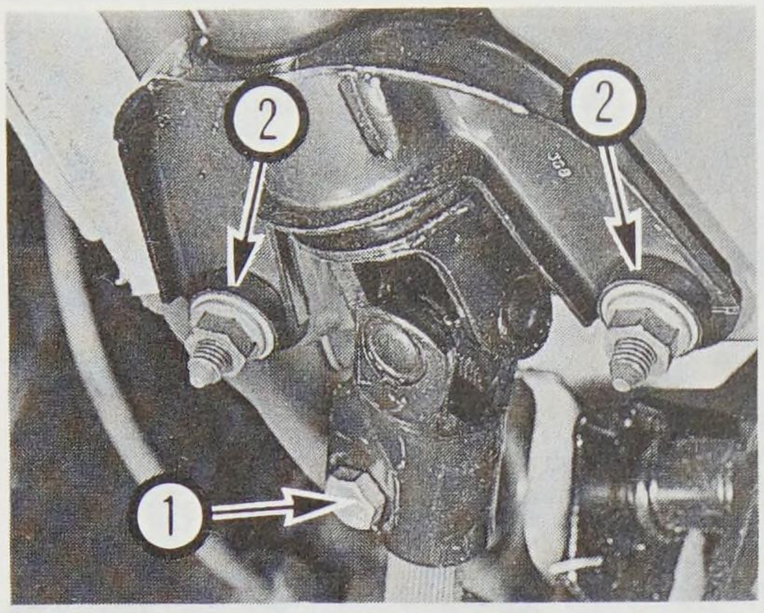
1 Position the front wheels in the straight-ahead position.
2 Prise out the central motif from the steering wheel.
3 Mark the hub in relation to the inner column.
4 Undo the steering wheel nut by a few turns (photo).
5 Using the palm of the hands, strike the underside of the steering wheel firmly to release the wheel from the column (the nut is left in position to prevent the steering wheel flying off).
6 Remove the steering wheel nut and lift off the steering wheel.
7 Refit in reverse order, lining up the previously made marks and tightening the steering wheel nut to the specified torque.

5 Steering column lock – removal and refitting

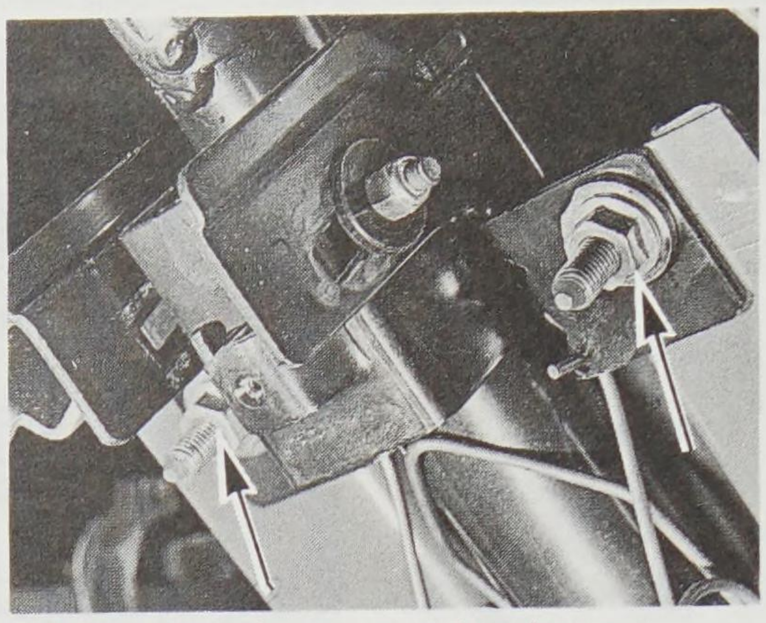
1 Remove the steering column shroud panels (Chapter 11, Section 39).
2 Insert the ignition key and turn it to align with the small arrow on the lock rim.
3 Remove the lock securing bolt.
4 Using a small screwdriver, depress the lock retaining plunger and withdraw the lock (photos).
5 Refit in reverse order.



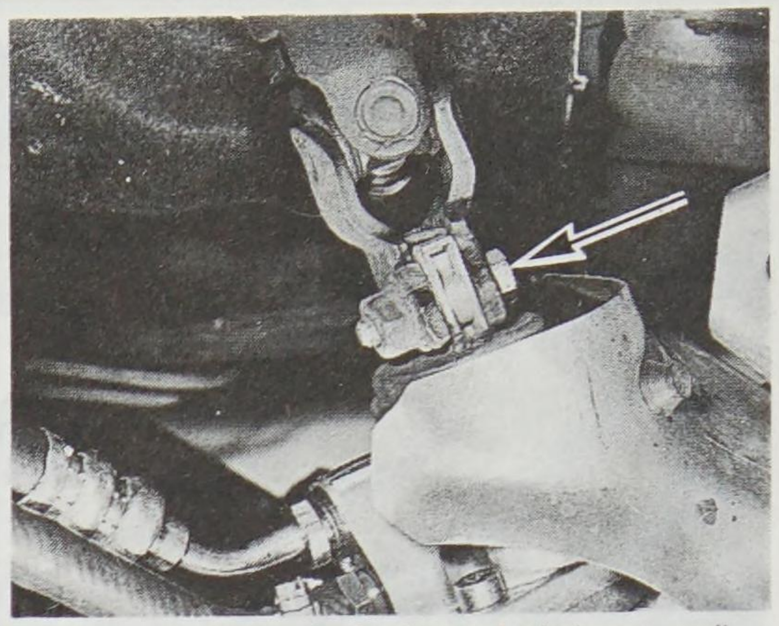
5.4B ... being depressed, and lock being withdrawn



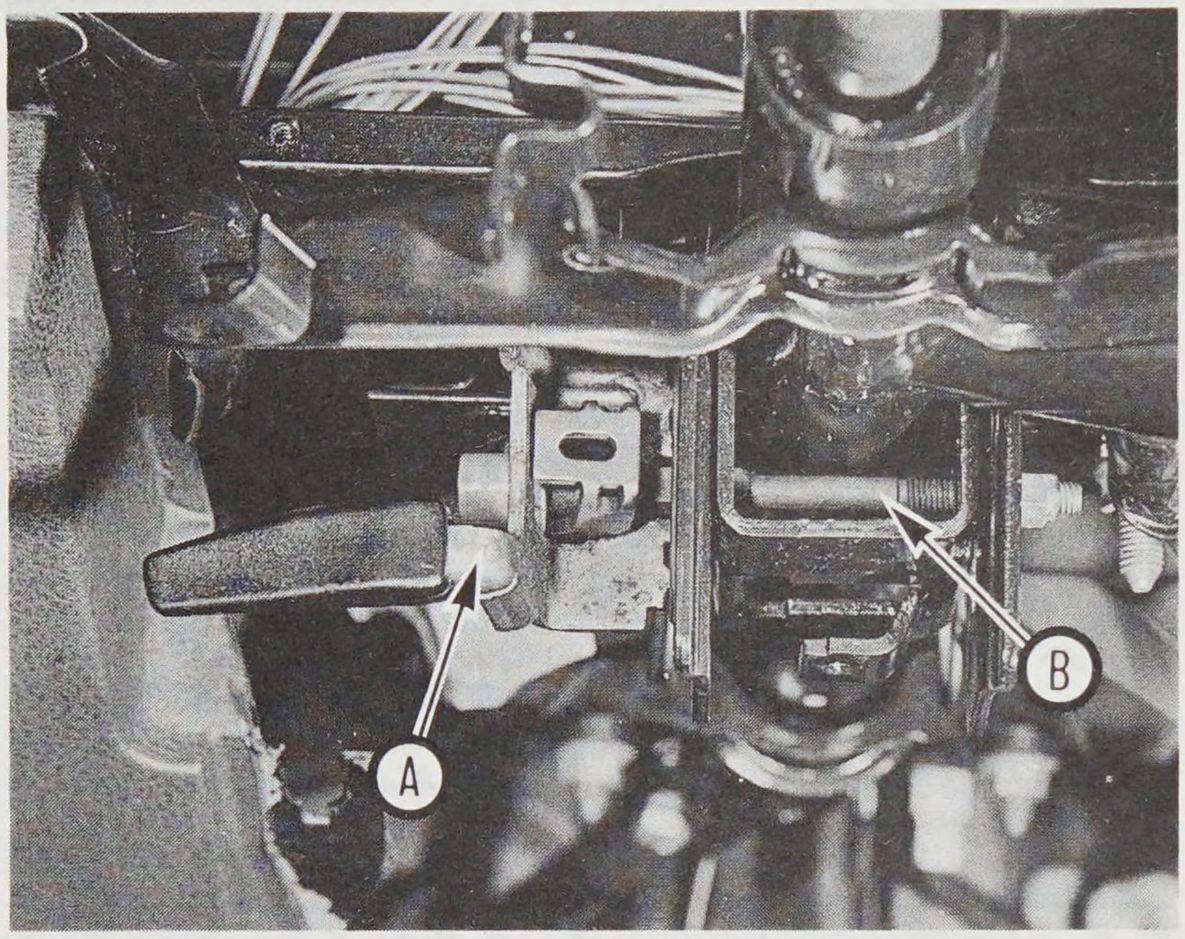
6.5 Steering column clamp bolt (1) and lower bracket nuts (2)



6.6 Steering column upper bracket nuts (arrowed)



6.8 Intermediate shaft clamp bolt (arrowed)



6.9 Column height adjuster (A) and retaining bolt (B)

6 Steering column – removal and refitting

1 Disconnect the battery negative terminal.
2 Remove the steering wheel (Section 4).
3 Remove the steering column switches and ignition switch.
4 Drop the fusebox panel down.
5 Make an alignment mark between the steering column and intermediate shaft, then remove the clamp bolt from the universal joint at the lower end of the column (photo).
6 Undo the column upper and lower bracket nuts (photo).
7 Withdraw the column from the studs and off the universal joint, over the fusebox rail and out of the vehicle.
8 To remove the intermediate shaft, remove the clamp bolt from the universal joint on the rack pinion (photo) and withdraw the shaft through the grommet in the bulkhead into the vehicle interior.
9 The column height adjuster mechanism is bolted to the column (photo).
10 Refitting is a reversal of removal, lining up the previously made marks and ensuring that the grommet in the bulkhead is not dislodged.
11 Tighten all bolts to their specified torque.

7 Steering gear – removal and refitting

1 Disconnect the battery negative terminal.
2 Raise the front of the vehicle onto axle stands and remove the front roadwheels. For greater access the wheel arch liners can also be removed.
3 On models with power-assisted steering, drain the hydraulic fluid from the system as described in Section 3. Disconnect the low pressure hose from the valve.
4 Also on power steering versions, unbolt and remove the heat shield from the rack.
5 On both versions, remove the cap from the gear linkage pivot and remove the linkage pivot bolt. Tie the linkage up out of the way.
6 Remove the pinch-bolt from the lower universal joint.
7 Remove the nuts from the track rod end balljoints and disconnect the balljoints using a balljoint separator tool.
8 Remove the bolts securing the rack to the subframe, retrieving the spacer washers and noting their fitted positions.
Note: *There have been several modifications to the steering rack and subframe which alter the dimension of the rack-to-subframe mounting points. Different thicknesses of spacer are fitted between the rack and subframe and under the mounting bolt heads. Due to the many combinations of the different mountings, and the non-interchangeability of the different components, if either the steering rack or subframe are to be renewed, the advice of a Peugeot dealer should be sought. Also, on vehicles with a castor angle of less than 1° 15′, a 2.0 mm spacer must be fitted between the steering rack and subframe.*
9 Disconnect the universal joint from the pinion and turn the rack over so that the valve assembly is facing downward.
10 Remove the rack from the vehicle by feeding it out through the wheel arch.
11 Refitting is a reversal of removal noting the following points:

(a) Use new nuts on the track rod balljoints
(b) On power-assisted steering versions, fill and bleed the hydraulic system as described in Section 3
(c) Tighten all nuts to their specified torque
(d) If a new rack or track rod or balljoint has been fitted check the front wheel alignment

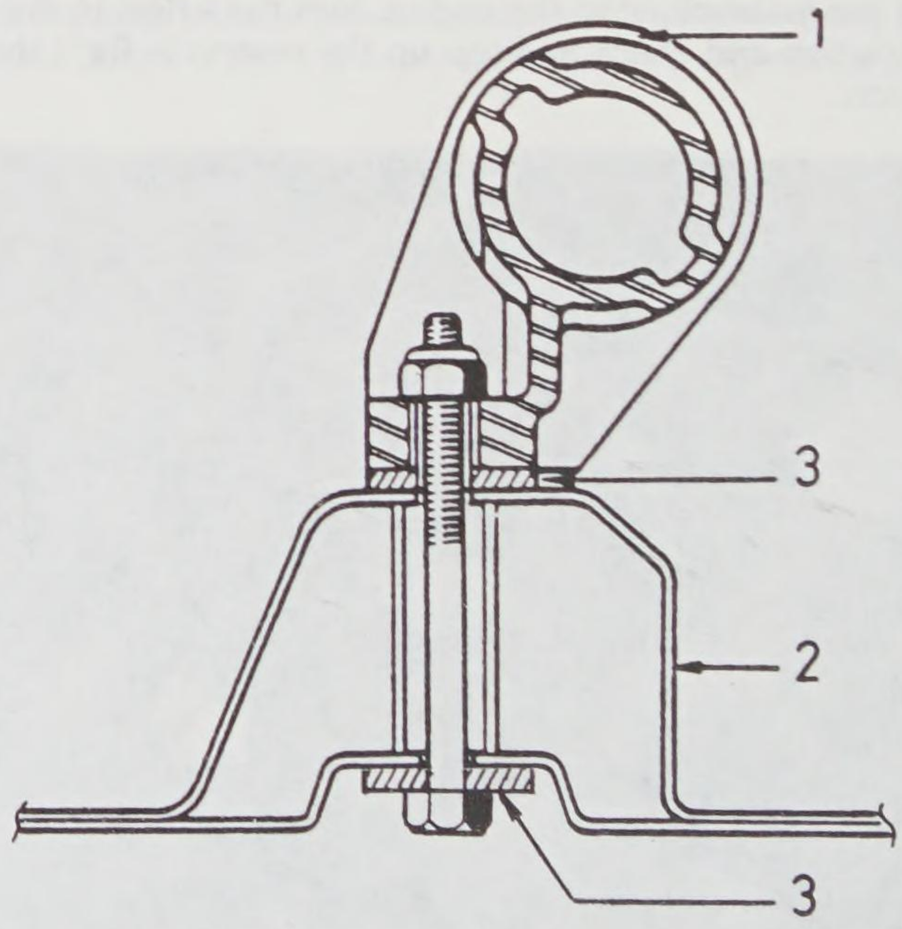
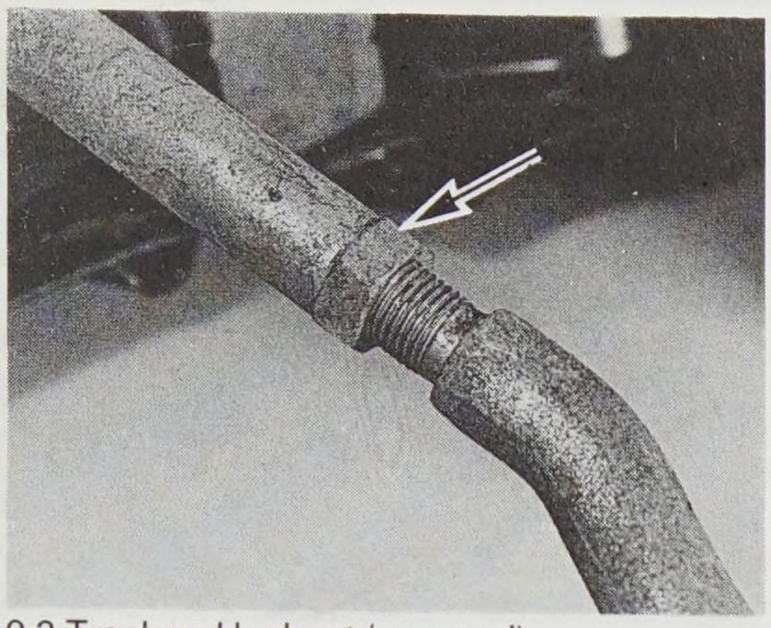
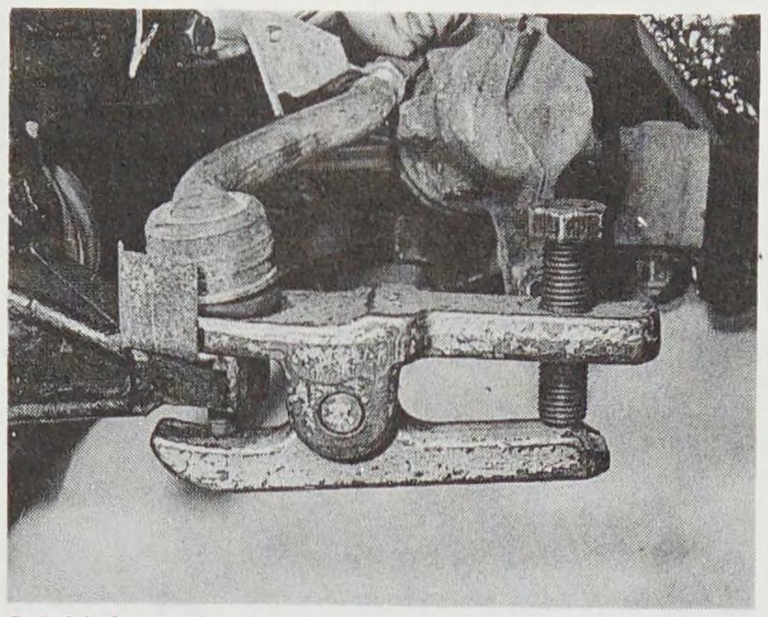


Fig 10.1 Steering gear-to-subframe mounting (Sec 7)

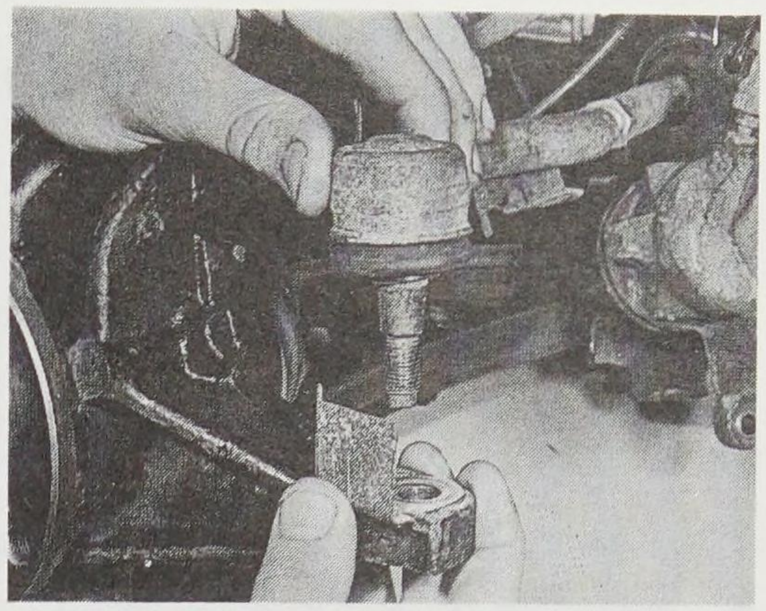
1 Steering rack 3 Spacers
2 Subframe



9.2 Track rod locknut (arrowed)



9.3 Using a balljoint extractor tool



9.6 Refitting the track rod balljoint to the hub carrier

8 Steering gear – overhaul

1 Generally, the steering gear has a very long life before any wear becomes evident, provided that the rack bellows are kept in good order, maintaining adequate lubrication.
2 In view of the special tooling required to overhaul the steering gear it is recommended that should the need arise, no overhaul is attempted, but the unit be exchanged for a factory reconditioned exchange unit.

9 Track rod end – removal and refitting

1 Raise the front of the vehicle onto axle stands and remove the relevant front road wheel.
2 Loosen the track rod locknut (photo).
3 Remove the track rod balljoint nut and use a balljoint separator tool to remove the balljoint from the hub carrier (photo).
4 Unscrew the track rod end from the track rod, noting the number of turns required to remove it.
5 Screw the new track rod end onto the track rod by the same number of turns required to removed it. This will maintain steering geometry within acceptable limits.
6 Clean the taper seat of the balljoint, then refit the balljoint to the hub carrier (photo), fit and tighten the nut to the specified torque.
Note: *If difficulty is experienced in removing or fitting a balljoint due to the taper pin turning in its seat, apply pressure to the top of the balljoint using a jack or long lever to force the balljoint onto its seat and prevent it turning.*
7 Tighten the locknut on the track rod end.
8 Refit the roadwheel and remove the vehicle from axle stands.
9 Check and if necessary adjust front wheel alignment as described in Section 14.

10 Track rod – removal and refitting

1 Remove the steering rack bellows as described in Section 11.
2 Using open-ended spanners, hold the rack and loosen the track rod joint socket. Unscrew the socket and withdraw the track rod.
3 Fit the new track rod, which is a reversal of removal, using a new lock washer, and tightening the joint socket to the specified torque.
4 On completion, check and adjust front wheel alignment as described in Section 14.

11 Steering rack bellows – renewal

1 Remove the relevant track rod end as described in Section 9.
2 Release the clips from each end of the bellows, then ease the bellows from the steering gear and off the track rod.

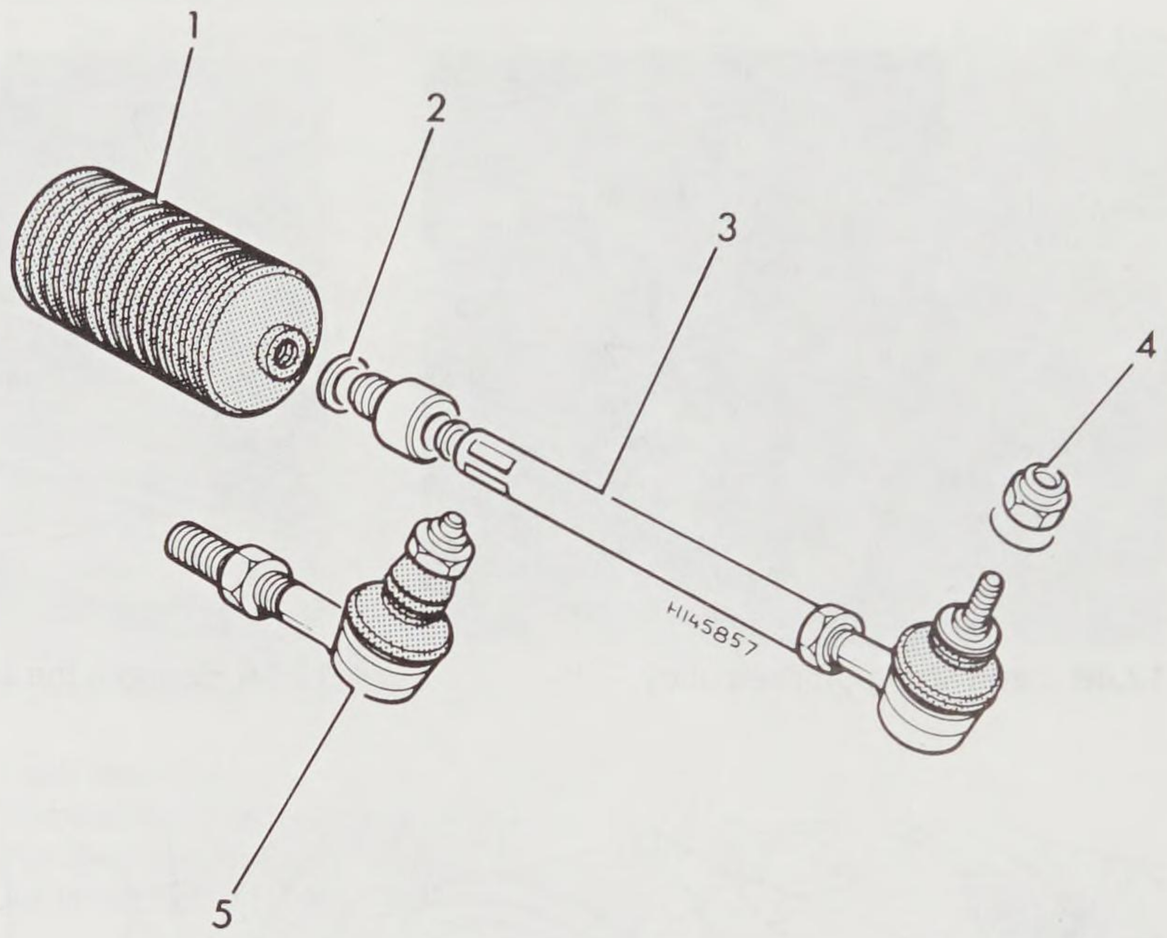


Fig 10.2 Track rod components (Sec 10)

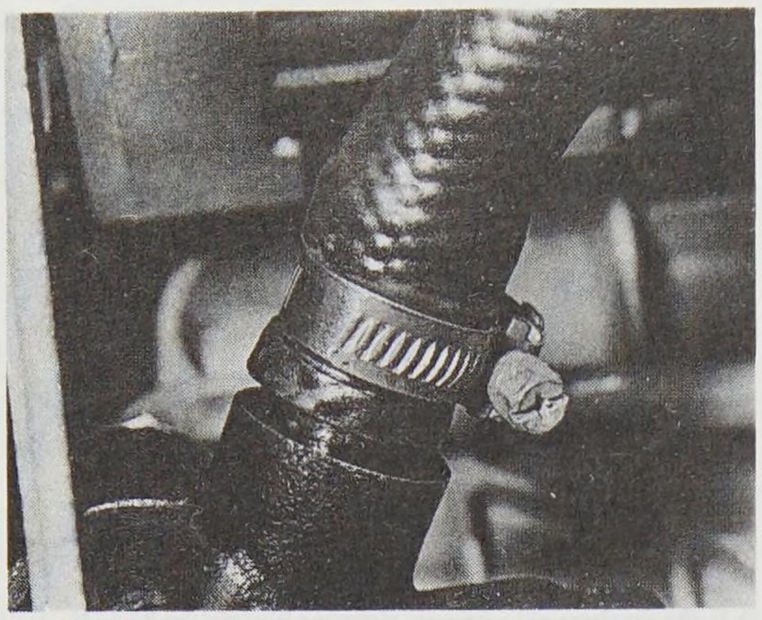
1 Bellows
2 Lock washer
3 Track rod
4 Self-locking nut
5 Track rod end

3 Clean the track rod and steering gear, ensuring the bellows locating grooves are clear of any debris. If necessary, add grease to the steering gear.
4 Grease the inside of the new bellows, then slide it over the track rod and onto the steering gear, locating the ends of the bellows in the locating grooves on the steering gear.
5 Settle the bellows in position on the steering gear so that it is not twisted or in tension.
6 Fit and tighten new clips around the bellows.
7 Check that on full lock, the bellows are not excessively tensioned.
8 Refit the track rod end as described in Section 9.

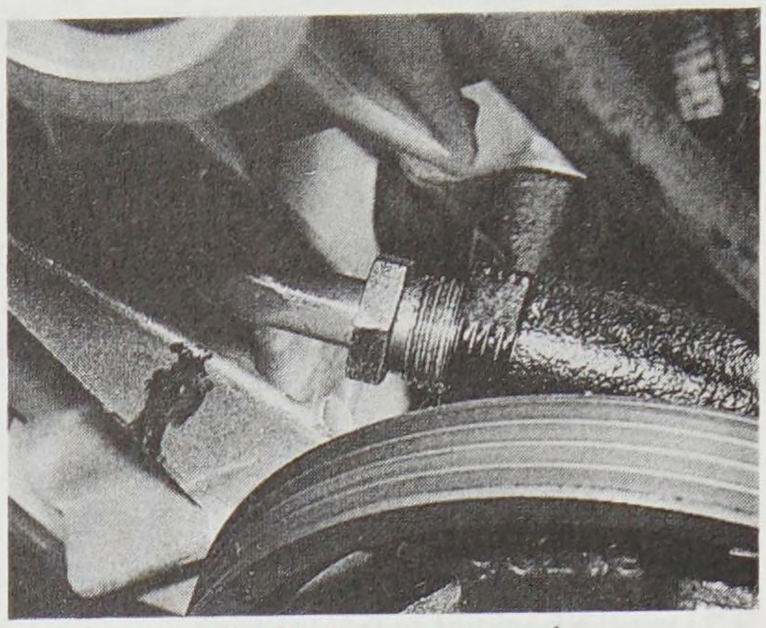
12 Power-assisted steering pump – removal and refitting

All models except Mi 16

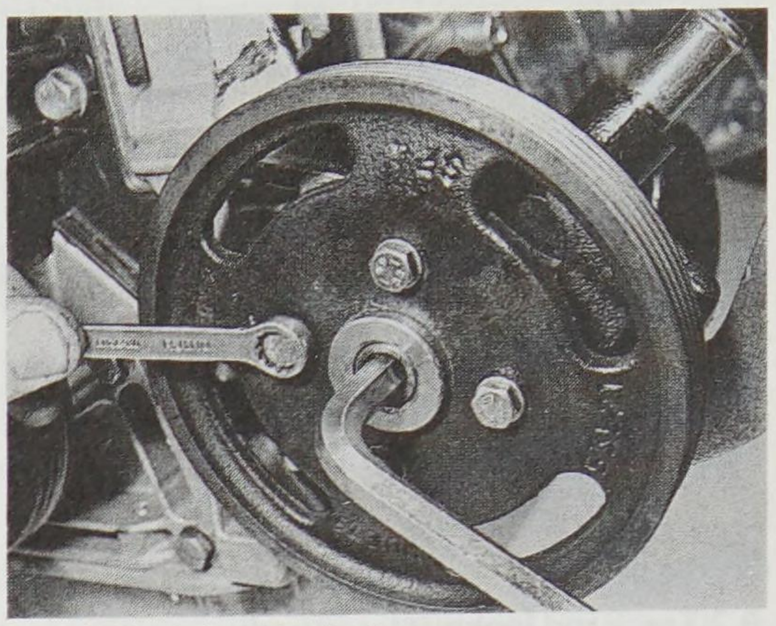
1 Drain the hydraulic fluid from the system as described in Section 3.
2 Remove the alternator drivebelt as described in Chapter 12, Section 2.
3 Disconnect the low pressure hose and unscrew the high pressure union from the pump (photos).
4 Remove the pump pulley bolts using an Allen key in the centre driveshaft to prevent the pulley moving, and lift off the pulley (photos).



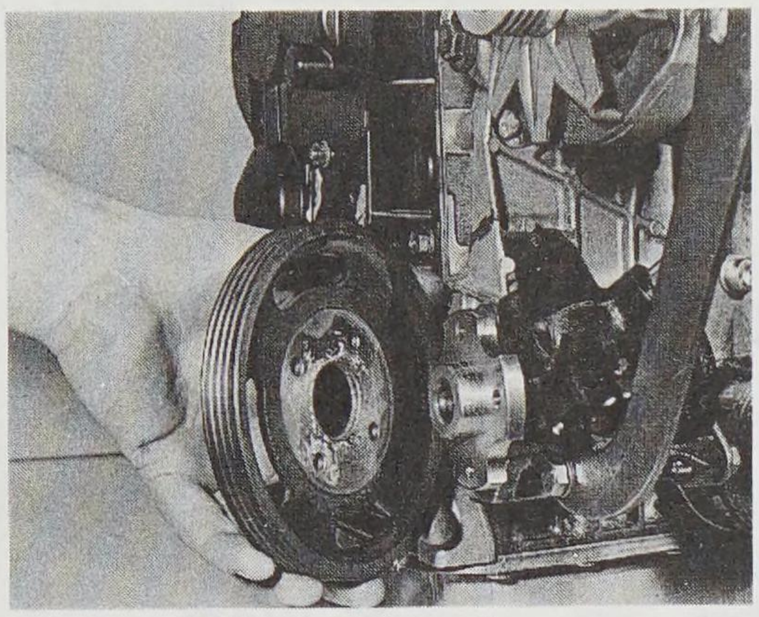
12.3A Power steering pump low pressure hose connection ...



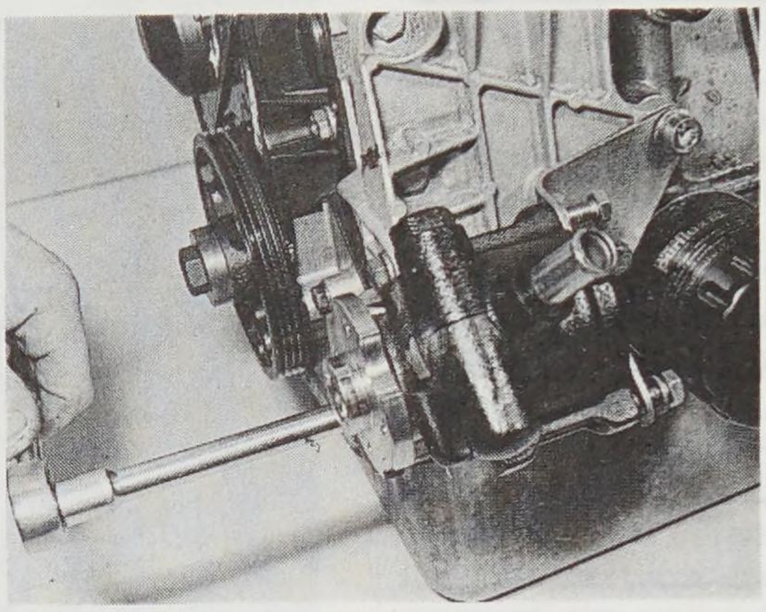
12.3B ... and the high pressure union



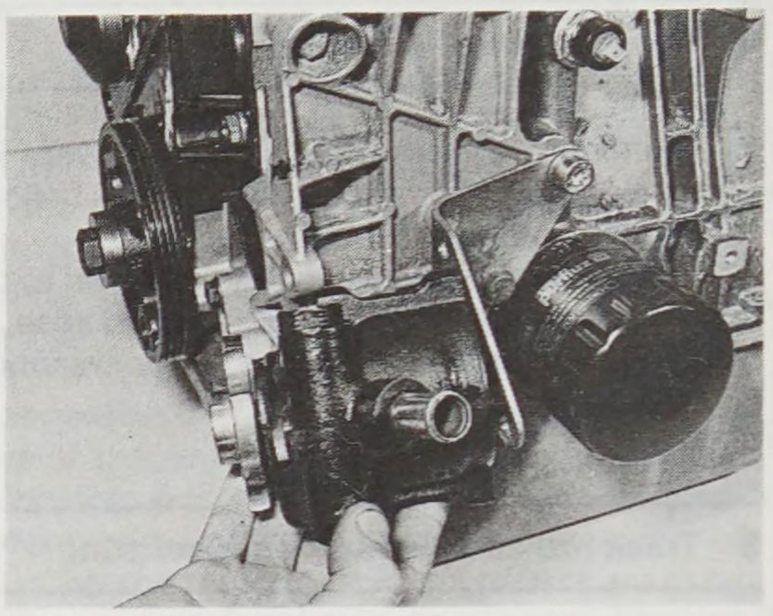
12.4A Undoing the bolts ...



12.4B ... and lifting off the pulley



12.5A Remove the bolts ...



12.5B ... and lift off the pump

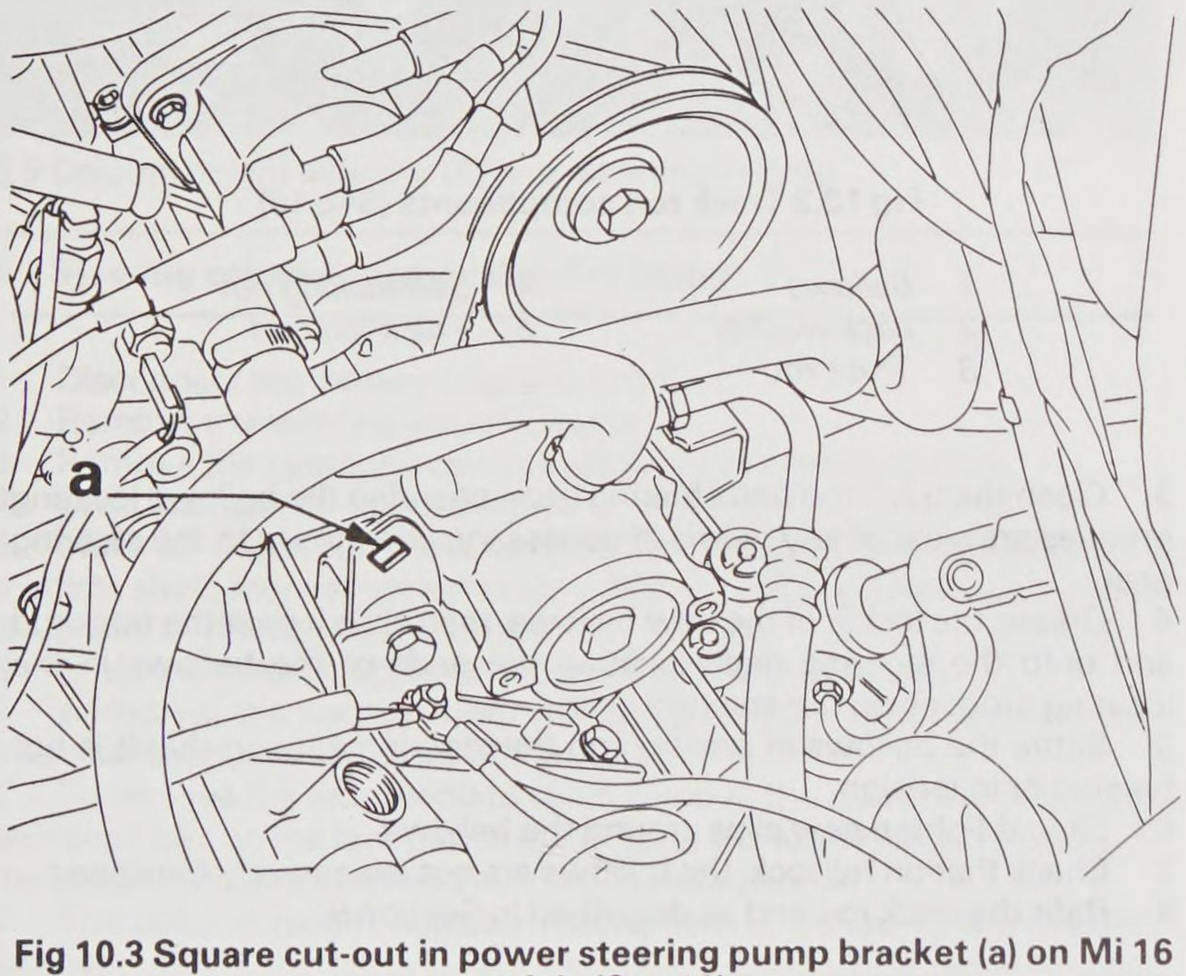


Fig 10.3 Square cut-out in power steering pump bracket (a) on Mi 16 models (Sec 12)

5 Undo the pump securing bolts and lift off the pump (photos).
6 The pump cannot be overhauled and if defective must be renewed.
7 Refitting is a reversal of removal.
8 Tension the drivebelt as described in Chapter 12, Section 2.
9 Fill and bleed the system as described in Section 3.

Mi 16 models

10 Drain the hydraulic fluid from the system as above.
11 Loosen the pump mounting bolts and remove the drivebelt.
12 Disconnect the high and low pressure unions on the pump.
13 Remove the mounting bolts and lift off the pump.
14 Refit in reverse order, then tension the belt by applying a torque of 55 Nm (40 lbf ft) for a new belt and 30 Nm (22 lbf ft) for a used belt by using the square end of a torque wrench in the square cut-out in the pump bracket, tightening the mounting bolts while the torque tension is maintained.
15 Fill and bleed the system as described in Section 3.

13 Power-assisted steering hoses – general

1 The hydraulic hoses must be inspected at the intervals given in the *'Routine maintenance'* section for leaks, especially at their end connections to the pump, steering rack and reservoir. Any signs of splitting, swelling or chaffing will mean renewal of the hose.
2 When disconnecting a hose, blank off its open end to prevent dirt entry.
3 On low pressure hoses, the original hose clamps are destroyed on removal as they must be cut through. Renew them with wormdrive clips, which are re-usable.
4 High pressure hoses have a metal pipe end fitting and threaded union, and care must be taken not to cross-thread the union when refitting, risking damage to the component.
5 Before removing any hose, make a careful note of its routing around the engine, and where it is clipped or tied to other components, and refit it the same way, in order to reduce the risk of chafing.

14 Steering angles and front wheel alignment

1 Accurate front wheel alignment is essential to provide good steering and roadholding characteristics and to ensure slow and even tyre wear. Before considering the steering angles, check that the tyres are correctly inflated, that the front wheels are not buckled, the hub bearings are not worn and that the steering linkage is in good order, without slackness or wear at the joints.

2 Wheel alignment consists of four factors:
Camber is the angle at which the roadwheels are set from the vertical when viewed from the front or rear of the vehicle. Positive camber is the angle (in degrees) that the wheels are tilted outwards at the top from the vertical.
Castor is the angle between the steering axis and a vertical line when viewed from each side of the vehicle. Positive castor is indicated when the steering axis is inclined towards the rear of the vehicle at its upper end.
Steering axis inclination is the angle when viewed from the front or rear of the vehicle between vertical and an imaginary line drawn between the upper and lower strut mountings.
Camber, castor and steering axis inclination are set during production of the car and any deviation from specified tolerance must therefore be due to gross wear in the suspension mountings or collision damage.
Toe is the amount by which the distance between the front inside edges of the roadwheel rims differs from that between the rear inside edges. If the distance between the front edges is less than that at the rear, the wheels are said to toe-in. If the distance between the front inside edges is greater than that at the rear, the wheels toe-out.

3 To check the front wheel alignment, first make sure that the lengths of both track-rods are equal when the steering is in the straight-ahead position.
4 Obtain a tracking gauge. These are available in various forms from accessory stores or one can be fabricated from a length of steel tubing suitably cranked to clear the sump and bellhousing and having a setscrew and locknut at one end.
5 With the gauge, measure the distance between the two wheel inner rims (at hub height) at the rear of the wheel. Push the vehicle forward to rotate the wheels through 180° (half a turn) and measure the distance between the wheel inner rims, again at hub height, at the front of the wheel. This last measurement should differ from the first by the appropriate toe-in according to specification (see Specifications Section).
6 Where the toe-in is found to be incorrect, release the track rod end locknuts and turn the track-rods equally. Only turn them a quarter of a turn at a time before rechecking the alignment, and release the bellows outer clips to prevent the bellows from twisting.
7 On completion tighten the track rod end locknuts, and refit the bellows clips.

15 Fault diagnosis – steering system

Symptom	Reason(s)
Stiff action	Lack of rack lubrication Seized track rod end balljoint Seized track rod inner balljoint Low tyre pressures Incorrect wheel alignment Steering gear damaged Power steering fault (see below)
Lack of power assistance	Fluid level low Pump drivebelt slack or broken Pump or steering gear defective Air in system
Excessive play at steering wheel	Worn track rod end balljoints Worn steering gear Worn steering column universal joints Worn lower suspension arm balljoints (Chapter 9)
Vehicle wanders or pulls to one side	Uneven tyre pressures Incorrect wheel alignment Worn track rod end balljoints Worn lower suspension arm balljoints (Chapter 9) Faulty shock absorber (Chapter 9) Accident damage
Excessive tyre wear and/or tyre squeal on cornering	Incorrect tyre pressures Wheels out of balance Incorrect wheel alignment Faulty shock absorbers (Chapter 9) Unsympathetic driving style

Chapter 11 Bodywork and fittings

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Specifications

Torque wrench settings

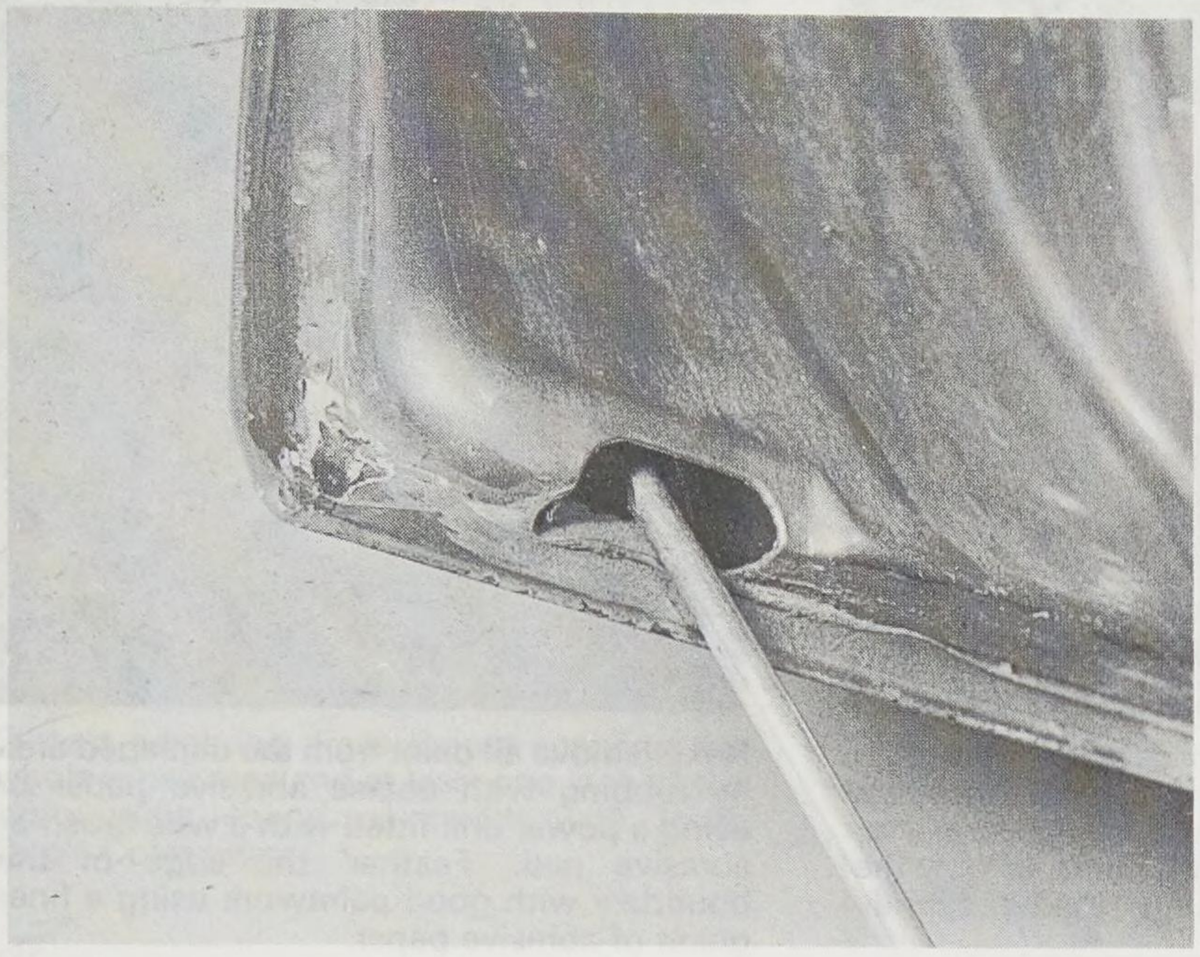
	Nm	lbf ft
Sunroof frame:		
Side nuts	14	10
Rear nuts	4	3
Front nuts	4	3

1 General description

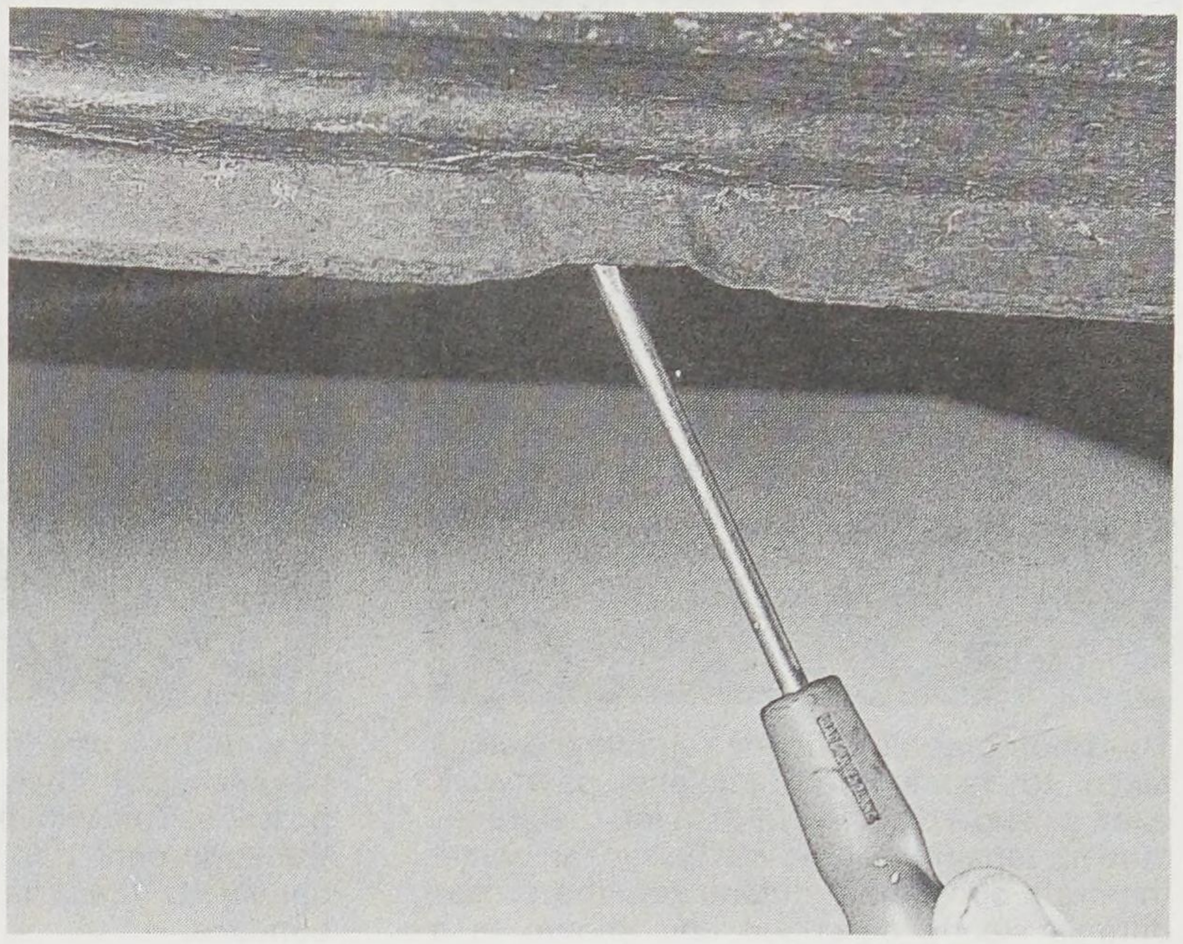
The bodyshell is of one-piece, welded construction, with the front wings bolted in place for ease of removal. The complete front panel and bumper assembly can also be removed if required.

The body has built-in impact absorbing zones to create a safety cell for occupants. Impact absorption is further enhanced by the moulded front and rear bumpers, energy absorbing steering column and laminated windscreen. The facia is a moulded, crushable unit which eliminates sharp corners. Rear seat belts and child-proof locks on the rear doors are standard.

All steel panels, sills and box sections receive the very latest anti-corrosion treatment and paint schemes to help ensure a long, rust-free life.



2.4A Clearing a door drain hole



2.4B Clearing a sill drain hole

2 Maintenance – bodywork and underframe

1 The general condition of a vehicle's bodywork is the one thing that significantly affects its value. Maintenance is easy but needs to be regular. Neglect, particulary after minor damage, can lead quickly to further deterioration and costly repair bills. It is important also to keep watch on those parts of the vehicle not immediately visible, for instance the underside, inside all the wheel arches and the lower part of the engine compartment.

2 The basic maintenance routine for the bodywork is washing – preferably with a lot of water, from a hose. This will remove all the loose solids which may have stuck to the vehicle. It is important to flush these off in such a way as to prevent grit from scratching the finish. The wheel arches and underframe need washing in the same way to remove any accumulated mud which will retain moisture and tend to encourage rust. Paradoxically enough, the best time to clean the underframe and wheel arches is in wet weather when the mud is thoroughly wet and soft. In very wet weather the underframe is usually cleaned of large accumulations automatically and this is a good time for inspection.

3 Periodically, except on vehicles with a wax-based underbody protective coating, it is a good idea to have the whole of the underframe of the vehicle steam cleaned, engine compartment included, so that a thorough inspection can be carried out to see what minor repairs and renovations are necessary. Steam cleaning is available at many garages and is necessary for removal of the accumulation of oily grime which sometimes is allowed to become thick in certain areas. If steam cleaning facilities are not available, there are one or two excellent grease solvents available which can be brush applied. The dirt can then be simply hosed off. Note that these methods should not be used on vehicles with wax-based underbody protective coating or the coating will be removed. Such vehicles should be inspected annually, preferably just prior to winter, when the underbody should be washed down and any damage to the wax coating repaired. Ideally, a completely fresh coat should be applied. It would also be worth considering the use of such wax-based protection for injection into door panels, sills, box sections, etc, as an additional safeguard against rust damage where such protection is not provided by the vehicle manufacturer.

4 After washing paintwork, wipe off with a chamois leather to give an unspotted clear finish. A coat of clear protective wax polish will give added protection against chemical pollutants in the air. If the paintwork sheen has dulled or oxidised, use a cleaner/polisher combination to restore the brilliance of the shine. This requires a little effort, but such dulling is usually caused because regular washing has been neglected. Care needs to be taken with metallic paintwork, as special non-abrasive cleaner/polisher is required to avoid damage to the finish. Always check that the door and ventilator opening drain holes and pipes are completely clear so that water can be drained out (photos). Bright work should be treated in the same way as paint work. Windscreens and windows can be kept clear of the smeary film which often appears by the use of a proprietary glass cleaner. Never use any form of wax or other body or chromium polish on glass.

3 Maintenance – upholstery and carpets

Mats and carpets should be brushed or vacuum cleaned regularly to keep them free of grit. If they are badly stained, remove them from the vehicle for scrubbing or sponging and make quite sure they are dry before refitting. Seats and interior trim panels can be kept clean by wiping with a damp cloth. If they do become stained (which can be more apparent on light coloured upholstery) use a little liquid detergent and a soft nail brush to scour the grime out of the grain of the material. Do not forget to keep the headlining clean in the same way as the upholstery. When using liquid cleaners inside the vehicle do not overwet the surfaces being cleaned. Excessive damp could get into the seams and padded interior causing stains, offensive odours or even rot. If the inside of the vehicle gets wet accidentally, it is worthwhile taking some trouble to dry it out properly, particularly where carpets are involved. *Do not leave oil or electric heaters inside the vehicle for this purpose.*

4 Minor body damage – repair

The photographic sequences on pages 202 and 203 illustrate the operations detailed in the following sub-sections.

Note: *For more detailed information about bodywork repair. The Haynes Publishing Group publish a book by Lindsay Porter called The Car Bodywork Repair Manual. This incorporates information on such aspects as rust treatment, painting and glass fibre repairs, as well as details on more ambitious repairs involving welding and panel beating.*

Repair of minor scratches in bodywork

If the scratch is very superficial, and does not penetrate to the metal of the bodywork, repair is very simple. Lightly rub the area of the scratch with a paintwork renovator, or a very fine cutting paste, to remove loose paint from the scratch and to clear the surrounding bodywork of wax polish. Rinse the area with clean water.

Apply touch-up paint to the scratch using a fine paint brush: continue to apply fine layers of paint until the surface of the paint in the scratch is level with the surrounding paintwork. Allow the new paint at least two weeks to harden: then blend it into the surrounding paintwork by rubbing the scratch area with a paintwork renovator or a very fine cutting paste. Finally, apply wax polish.

Where the scratch has penetrated right through to the metal of the bodywork, causing the metal to rust, a different repair technique is required. Remove any loose rust from the bottom of the scratch with a penknife, then apply rust inhibiting paint to prevent the formation of rust in the future. Using a rubber or nylon applicator fill the scratch with

This photographic sequence shows the steps taken to repair the dent and paintwork damage shown above. In general, the procedure for repairing a hole will be similar; where there are substantial differences, the procedure is clearly described and shown in a separate photograph.

First remove any trim around the dent, then hammer out the dent where access is possible. This will minimise filling. Here, after the large dent has been hammered out, the damaged area is being made slightly concave.

Next, remove all paint from the damaged area by rubbing with coarse abrasive paper or using a power drill fitted with a wire brush or abrasive pad. 'Feather' the edge of the boundary with good paintwork using a finer grade of abrasive paper.

Where there are holes or other damage, the sheet metal should be cut away before proceeding further. The damaged area and any signs of rust should be treated with Turtle Wax Hi-Tech Rust Eater, which will also inhibit further rust formation.

For a large dent or hole mix Holts Body Plus Resin and Hardener according to the manufacturer's instructions and apply around the edge of the repair. Press Glass Fibre Matting over the repair area and leave for 20-30 minutes to harden. Then ...

... brush more Holts Body Plus Resin and Hardener onto the matting and leave to harden. Repeat the sequence with two or three layers of matting, checking that the final layer is lower than the surrounding area. Apply Holts Body Plus Filler Paste as shown in Step 5B.

For a medium dent, mix Holts Body Plus Filler Paste and Hardener according to the manufacturer's instructions and apply it with a flexible applicator. Apply thin layers of filler at 20-minute intervals, until the filler surface is slightly proud of the surrounding bodywork.

For small dents and scratches use Holts No Mix Filler Paste straight from the tube. Apply it according to the instructions in thin layers, using the spatula provided. It will harden in minutes if applied outdoors and may then be used as its own knifing putty.

Use a plane or file for initial shaping. Then, using progressively finer grades of wet-and-dry paper, wrapped round a sanding block, and copious amounts of clean water, rub down the filler until glass smooth. 'Feather' the edges of adjoining paintwork.

7

Protect adjoining areas before spraying the whole repair area and at least one inch of the surrounding sound paintwork with Holts Dupli-Color primer.

8

Fill any imperfections in the filler surface with a small amount of Holts Body Plus Knifing Putty. Using plenty of clean water, rub down the surface with a fine grade wet-and-dry paper – 400 grade is recommended – until it is really smooth.

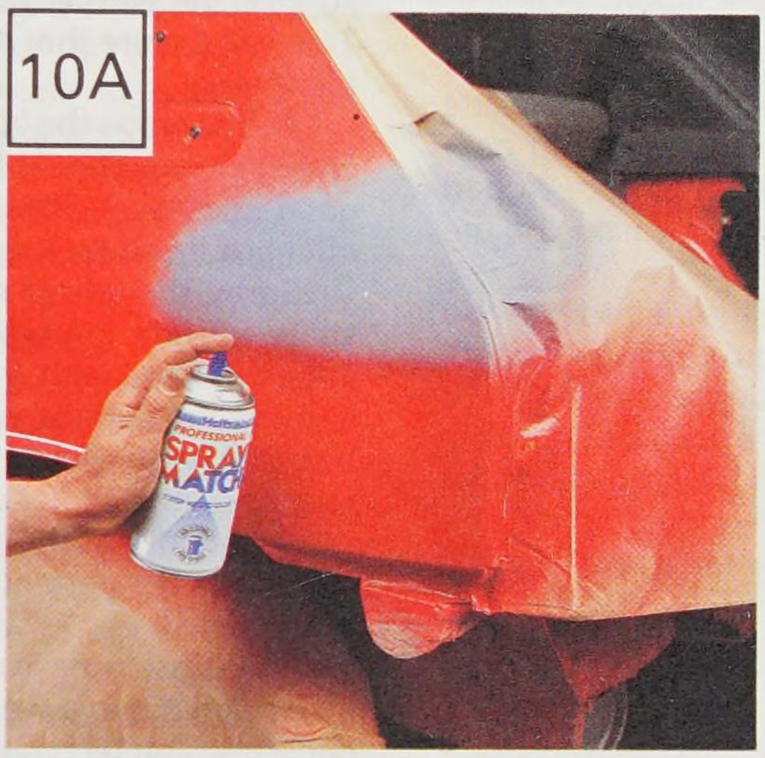
9

Carefully fill any remaining imperfections with knifing putty before applying the last coat of primer. Then rub down the surface with Holts Body Plus Rubbing Compound to ensure a really smooth surface.

10

Protect surrounding areas from overspray before applying the topcoat in several thin layers. Agitate Holts Dupli-Color aerosol thoroughly. Start at the repair centre, spraying outwards with a side-to-side motion.

10A



If the exact colour is not available off the shelf, local Holts Professional Spraymatch Centres will custom fill an aerosol to match perfectly.

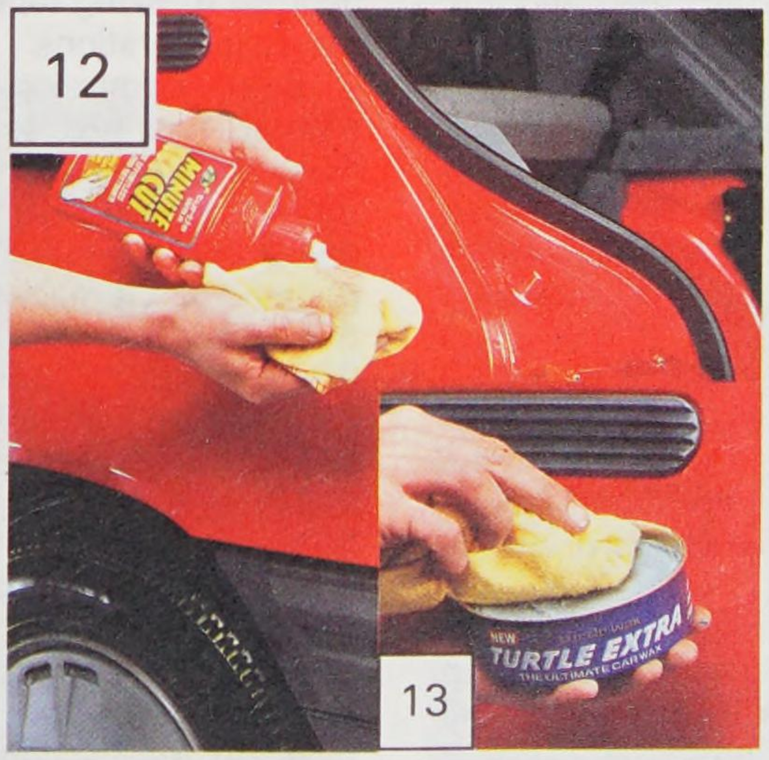
10B

To identify whether a lacquer finish is required, rub a painted unrepaired part of the body with wax and a clean cloth.

11

If *no* traces of paint appear on the cloth, spray Holts Dupli-Color clear lacquer over the repaired area to achieve the correct gloss level.

12



13

The paint will take about two weeks to harden fully. After this time it can be 'cut' with a mild cutting compound such as Turtle Wax Minute Cut prior to polishing with a final coating of Turtle Wax Extra.

14

When carrying out bodywork repairs, remember that the quality of the finished job is proportional to the time and effort expended.

bodystopper paste. If required, this paste can be mixed with cellulose thinners to provide a very thin paste which is ideal for filling narrow scratches. Before the stopper-paste in the scratch hardens, wrap a piece of smooth cotton rag around the top of a finger. Dip the finger in cellulose thinners and then quickly sweep it across the surface of the stopper-paste in the scratch: this will ensure that the surface of the stopper-paste is slightly hollowed. The scratch can now be painted over as described earlier in this Section.

Repair of dents in bodywork

When deep denting of the vehicle's bodywork has taken place, the first task is to pull the dent out, until the affected bodywork almost attains its original shape. There is little point in trying to restore the original shape completely, as the metal in the damaged area will have stretched on impact and cannot be reshaped fully to its original contour. It is better to bring the level of the dent up to a point which is about $\frac{1}{2}$ in (3 mm) below the level of the surrounding bodywork. In cases where the dent is very shallow anyway, it is not worth trying to pull it out at all. If the underside of the dent is accessible, it can be hammered out gently from behind, using a mallet with a wooden or plastic head. Whilst doing this, hold a suitable block of wood firmly against the outside of the panel to absorb the impact from the hammer blows and thus prevent a large area of the bodywork from being 'belled-out'.

Should the dent be in a section of the bodywork which has a double skin or some other factor making it inaccessible from behind, a different technique is called for. Drill several small holes through the metal inside the area – particularly in the deeper section. Then screw long self-tapping screws into the holes just sufficiently for them to gain a good purchase in the metal. Now the dent can be pulled out by pulling on the protruding heads of the screws with a pair of pliers.

The next stage of the repair is the removal of the paint from the damaged area, and from an inch or so of the surrounding ' sound' bodywork. This is accomplished most easily by using a wire brush or abrasive pad on a power drill, although it can be done just as effectively by hand using sheets of abrasive paper. To complete the preparation for filling, score the surface of the bare metal with a screwdriver or the tang of a file, or alternatively, drill small holes in the affected area. This will provide a really good 'key' for the filler paste.

To complete the repair see the Section on filling and re-spraying.

Repair of rust holes or gashes in bodywork

Remove all paint from the affected area and from an inch or so of the surrounding 'sound' bodywork, using an abrasive pad or a wire brush on a power drill. If these are not available a few sheets of abrasive paper will do the job just as effectively. With the paint removed you will be able to gauge the severity of the corrosion and therefore decide whether to renew the whole panel (if this is possible) or to repair the affected area. New body panels are not as expensive as most people think and it is often quicker and more satisfactory to fit a new panel than to attempt to repair large areas of corrosion.

Remove all fittings from the affected area except those which will act as a guide to the original shape of the damaged bodywork (eg headlamp shells etc). Then, using tin snips or a hacksaw blade, remove all loose metal and any other metal badly affected by corrosion. Hammer the edges of the hole inwards in order to create a slight depression for the filler paste.

Wire brush the affected are to remove the powdery rust from the surface of the remaining metal. Paint the affected area with rust inhibiting paint; if the back of the rusted area is accessible treat this also.

Before filling can take place it will be necessary to block the hole in some way. This can be achieved by the use of aluminium or plastic mesh, or aluminium tape.

Aluminium or plastic mesh is probably the best material to use for a large hole. Cut a piece to the approximate size and shape of the hole to be filled, then position it in the hole so that its edges are below the level of the surrounding bodywork. It can be retained in position by several blobs of filler paste around its periphery.

Aluminium tape should be used for small or very narrow holes. Pull a piece off the roll and trim it to the approximate size and shape required, then pull off the backing paper (if used) and stick the tape over the hole; it can be overlapped if the thickness of one piece is insufficient. Burnish down the edges of the tape with the handle of a screwdriver or similar, to ensure that the tape is securely attached to the metal underneath.

Bodywork repairs – filling and re-spraying

Before using this Section, see the Sections on dent, deep scratch, rust holes and gash repairs.

Many types of bodyfiller are available, but generally speaking those proprietary kits which contain a tin of filler paste and a tube of resin hardener are best for this type of repair. A wide, flexible plastic or nylon applicator will be found invaluable for imparting a smooth and well contoured finish to the surface of the filler.

Mix up a little filler on a clean piece of card or board – measure the hardener carefully (follow the maker's instructions on the pack) otherwise the filler will set too rapidly or too slowly. Using the applicator, apply the filler paste to the prepared area: draw the applicator across the surface of the filler to achieve the correct contour and to level the filler surface. As soon as a contour that approximates to the correct one is achieved, stop working the paste – if you carry on too long the paste will become sticky and begin to 'pick up' on the applicator. Continue to add thin layers of filler paste at twenty-minute intervals until the level of the filler is just proud of the surrounding bodywork.

Once the filler has hardened, excess can be removed using a metal plane or file. From then on, progressively finer grades of abrasive paper should be used, starting with a 40 grade production paper and finishing with 400 grade wet-and-dry paper. Always wrap the abrasive paper around a flat rubber, cork, or wooden block – otherwise the surface of the filler will not be completely flat. During the smoothing of the filler surface the wet-and-dry paper should be periodically rinsed in water. This will ensure that a very smooth finish is imparted to the filler at the final stage.

At this stage the 'dent' should be surrounded by a ring of bare metal, which in turn should be encircled by the finely 'feathered' edge of the good paintwork. Rinse the repair area with clean water, until all of the dust produced by the rubbing-down operation has gone.

Spray the whole repair area with a light coat of primer – this will show up any imperfections in the surface of the filler. Repair these imperfections with fresh filler paste or bodystopper, and once more smooth the surface with abrasive paper. If bodystopper is used, it can be mixed with cellulose thinners to form a really thin paste which is ideal for filling small holes. Repeat this spray and repair procedure until you are satisfied that the surface of the filler, and the feathered edge of the paintwork are perfect. Clean the repair area with clean water and allow to dry fully.

The repair area is now ready for final spraying. Paint spraying must be carried out in a warm, dry, windless and dust free atmosphere. This condition can be created artificially if you have access to a large indoor working area, but if you are forced to work in the open, you will have to pick your day very carefully. If you are working indoors, dousing the floor in the work area with water will help to settle the dust which would otherwise be in the atmosphere. If the repair area is confined to one body panel, mask off the surrounding panels; this will help to minimise the effects of a slight mis-match in paint colours. Bodywork fittings (eg chrome strips, door handles etc) will also need to be masked off. Use genuine masking tape and several thicknesses of newspaper for the masking operations.

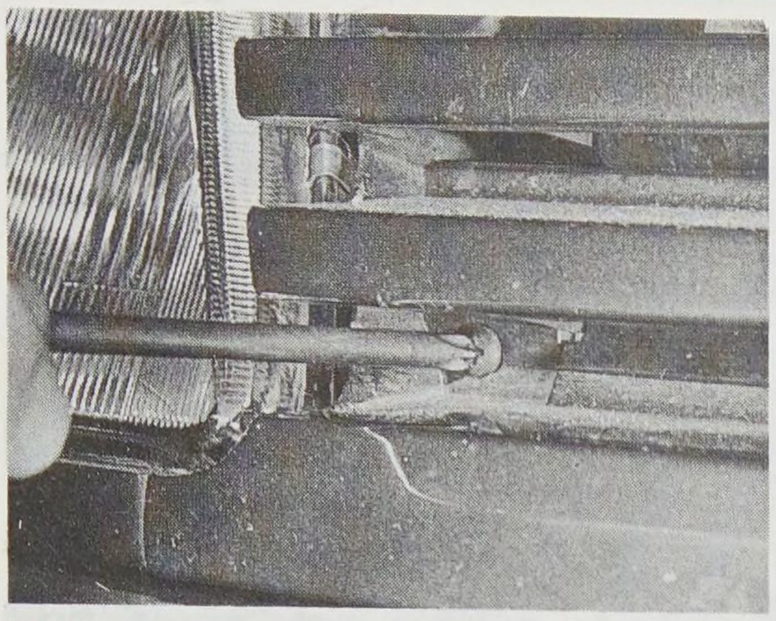
Before commencing to spray, agitate the aerosol can thoroughly, then spray a test area (an old tin, or similar) until the technique is mastered. Cover the repair area with a thick coat of primer; the thickness should be built up using several thin layers of paint rather than one thick one. Using 400 grade wet-and-dry paper, rub down the surface of the primer until it is really smooth. While doing this, the work area should be thoroughly doused with water, and the wet-and-dry paper periodically rinsed in water. Allow to dry before spraying on more paint.

Spray on the top coat, again building up the thickness by using several thin layers of paint. Start spraying in the centre of the repair area and then, using a circular motion, work outwards until the whole repair area and about 2 inches of the surrounding original paintwork is covered. Remove all masking material 10 to 15 minutes after spraying on the final coat of paint.

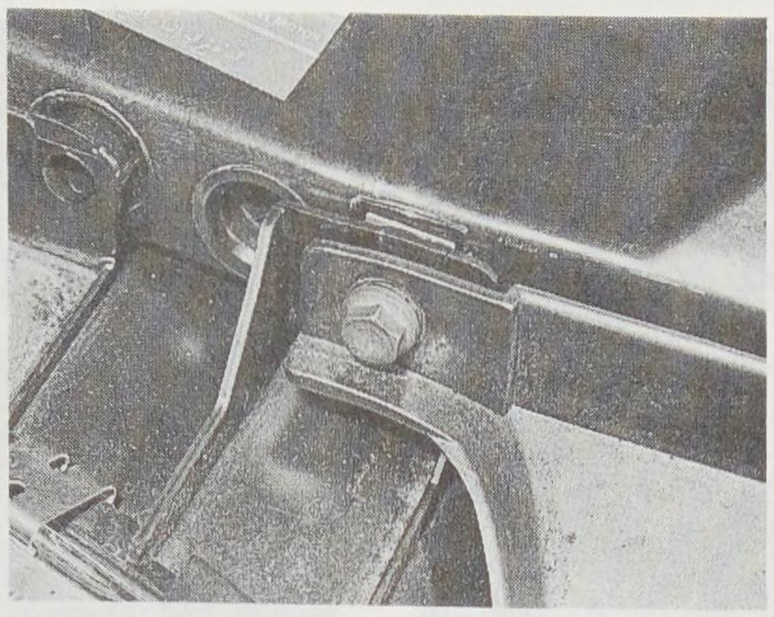
Allow the new paint at least two weeks to harden, then, using a paintwork renovator or a very fine cutting paste, blend the edges of the paint into the existing paintwork. Finally, apply wax polish.

Plastic components

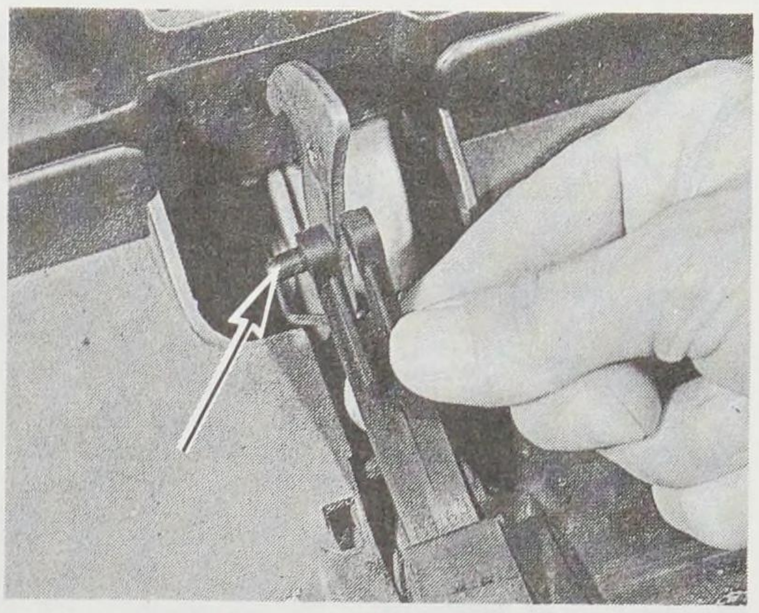
With the use of more and more plastic body components by the vehicle manufacturers (eg bumpers, spoilers, and in some cases major body panels), rectification of more serious damage to such items has become a matter of either entrusting repair work to a specialist in this field, or renewing complete components. Repair of such damage by the



6.2 Removing a screw from the radiator grille



6.3 Radiator grille top inner securing bolt



6.4 Bonnet release handle plastic pin (arrowed)

DIY owner is not really feasible owing to the cost of the equipment and materials required for effecting such repairs. The basic technique involves making a groove along the line of the crack in the plastic using a rotary burr in a power drill. The damaged part is then welded back together by using a hot air gun to heat up and fuse a plastic filler rod into the groove. Any excess plastic is then removed and the area rubbed down to a smooth finish. It is important that a filler rod of the correct plastic is used, as body components can be made of a variety of different types (eg polycarbonate, ABS, polypropylene).

Damage of a less serious nature (abrasions, minor cracks etc) can be repaired by the DIY owner using a two-part epoxy filler repair material. Once mixed in equal proportions, this is used in similar fashion to the bodywork filler used on metal panels. The filler is usually cured in twenty to thirty minutes, ready for sanding and painting.

If the owner is renewing a complete component himself, or if he has repaired it with epoxy filler, he will be left with the problem of finding a suitable paint for finishing which is compatible with the type of plastic used. At one time the use of a universal paint was not possible owing to the complex range of plastics encountered in body component applications. Standard paints, generally speaking, will not bond to plastic or rubber satisfactorily. However, it is now possible to obtain a plastic body parts finishing kit which consists of a pre-primer treatment, a primer and coloured top coat. Full instructions are normally supplied with a kit, but basically the method of use is to first apply the pre-primer to the component concerned and allow it to dry for up to 30 minutes. Then the primer is applied and left to dry for about an hour before finally applying the special coloured top coat. The result is a correctly coloured component where the paint will flex with the plastic or rubber, a property that standard paint does not normally possess.

5 Major body damage – repair

The construction of the body is such that great care must be taken when making cuts, or when renewing major members, to preserve the basic safety characteristics of the structure. In addition, the heating of certain areas is not advisable.

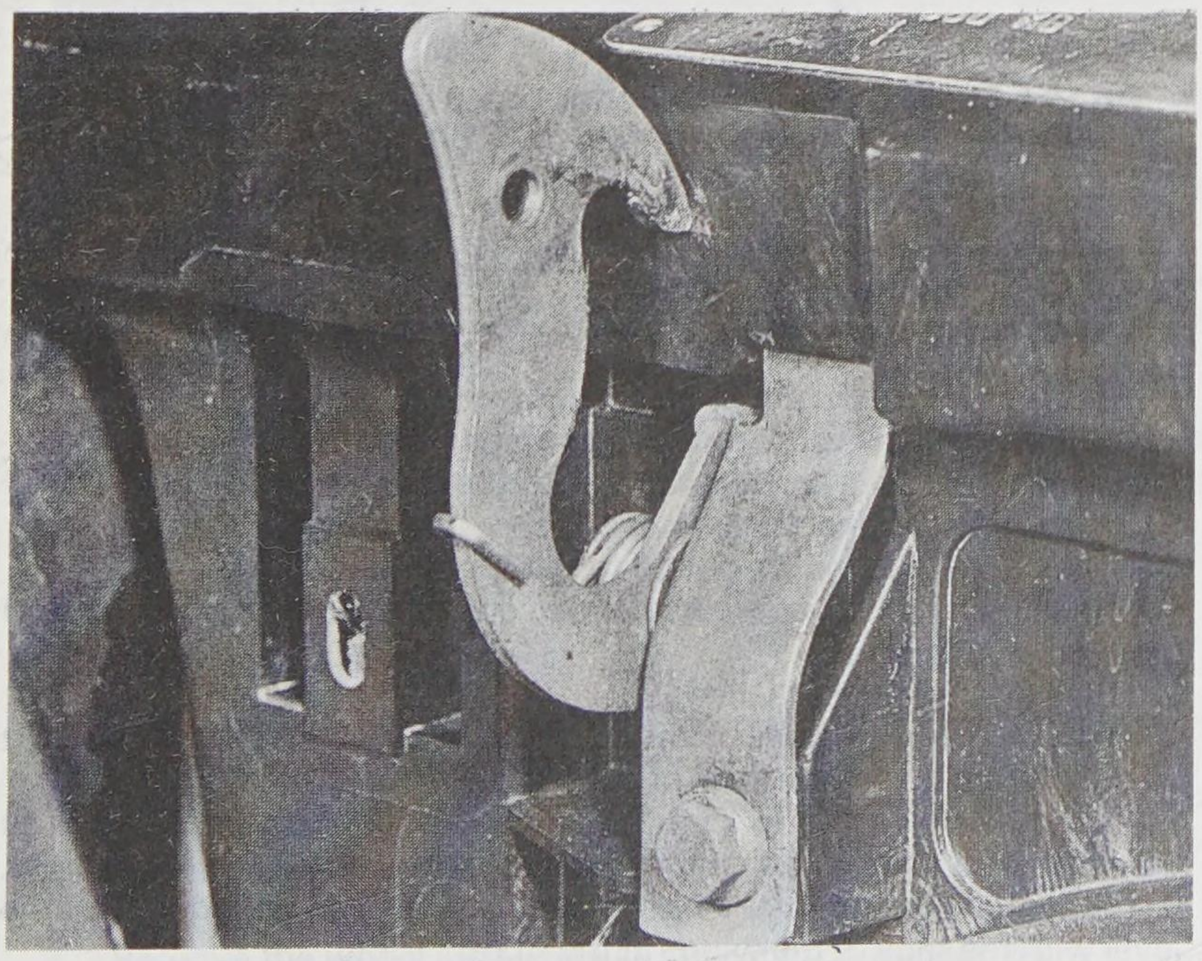
In view of the specialised knowledge necessary for this work, and the alignment jigs and special tools frequently required, the owner is advised to consult a specialist body repairer or Peugeot dealer.

6 Radiator grille – removal and refitting

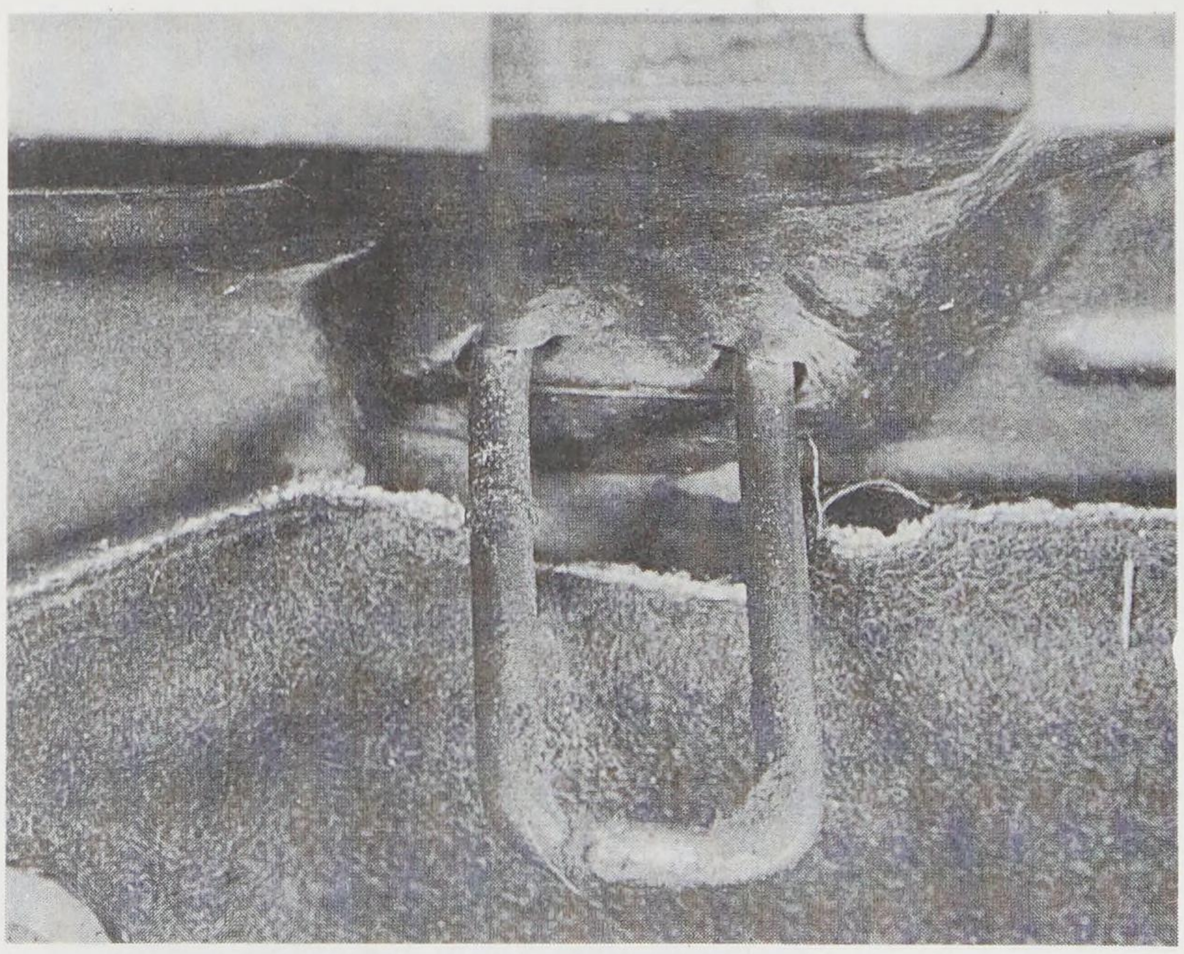
1 Prop open the bonnet.
2 Remove the screws from the front of the grille (photo).
3 Remove the top inner bolts securing the headlamps and upper edge of the grille (photo).
4 Push the bonnet release handle plastic pin out of engagement with the release latch (photo).
5 Lift the grille upward to disengage the lower locating lugs and withdraw the grille.
6 Refit in reverse order.

7 Bonnet release latch – removal and refitting

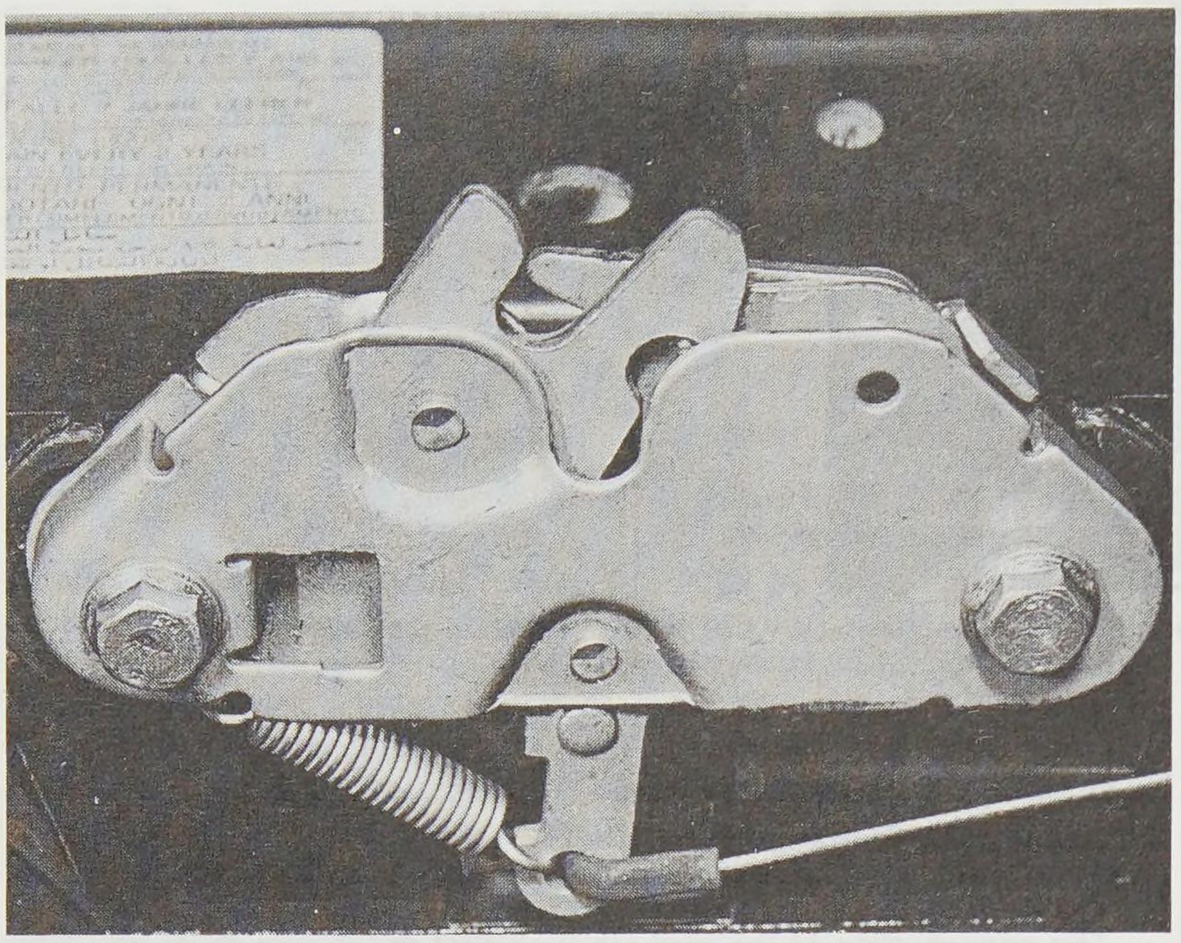
1 Remove the radiator grille (Section 6).
2 Unbolt and withdraw the latch from the front panel (photo).
3 Refit in reverse order.
4 Upper catch is welded to the bonnet (photo).



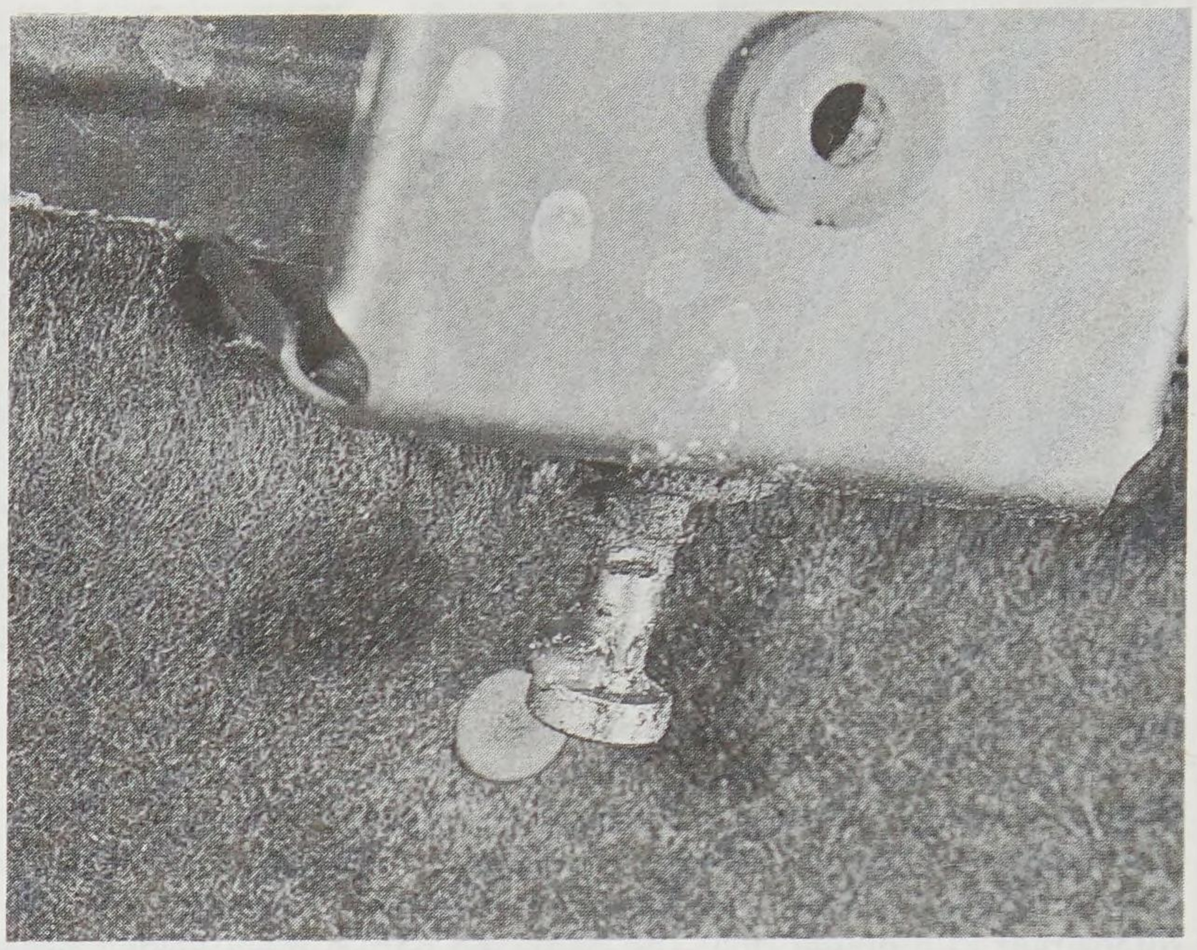
7.2 Bonnet release latch on front panel



7.4 Bonnet upper catch



8.2 Bonnet lock assembly



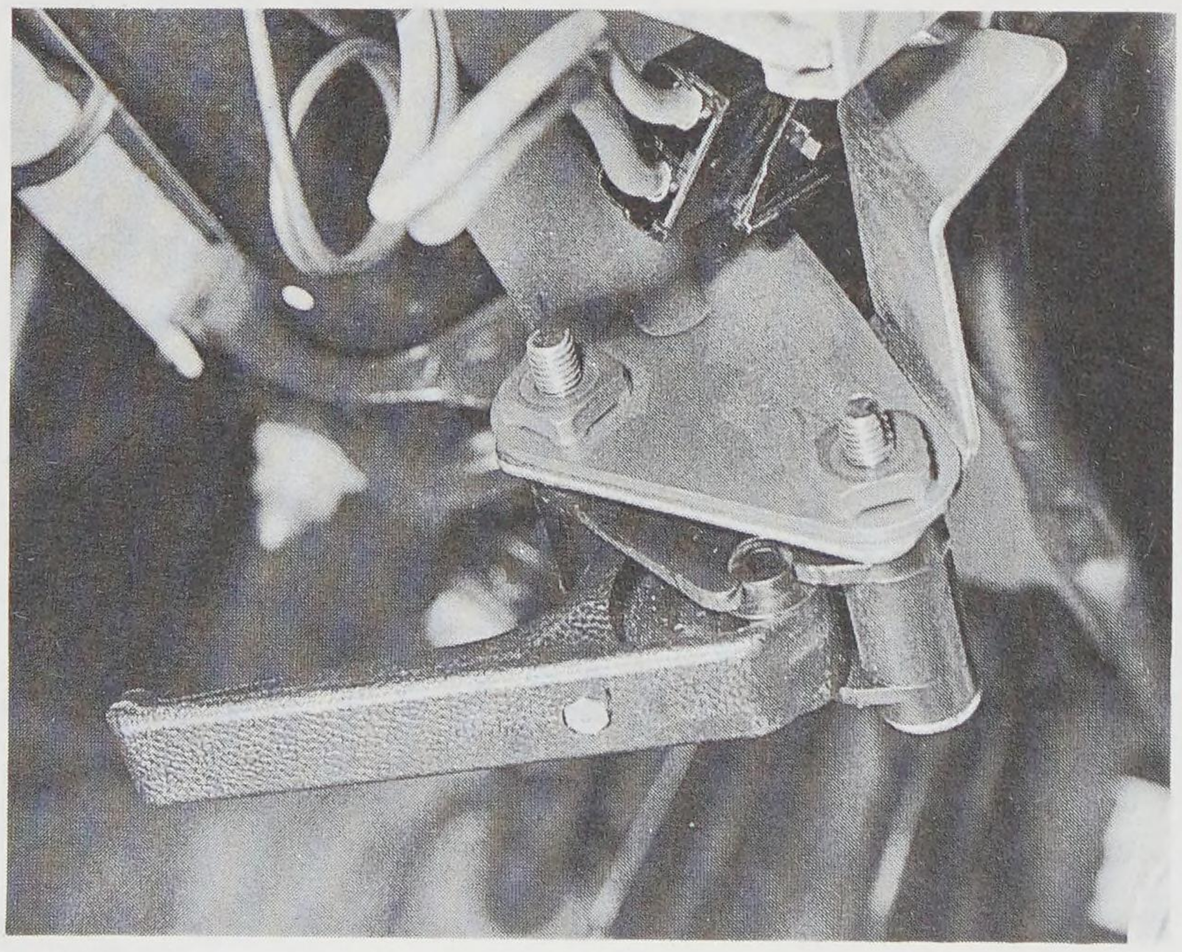
8.5 Bonnet striker

8 Bonnet lock – removal and refitting

1 Prop open the bonnet.
2 Disconnect the release cable from the lock lever (photo).
3 Unbolt and remove the lock from the front panel.
4 Refit in reverse order.
5 The bonnet striker is screwed into a housing welded to the bonnet. It is adjustable in the housing to allow for adjustment of the bonnet (photo).

9 Bonnet release cable – renewal

1 Open the bonnet and disconnect the cable from the junction on the front cross panel.
2 Drop the fusebox panel down.
3 Remove the two bolts securing the release handle to the bracket (photo).
4 Unhook the cable from the handle.
5 Feed the cable through the bulkhead into the engine compartment.
6 Refit in reverse order, ensuring the bulkhead grommet is not dislodged in the process.



9.3 Bonnet interior release handle

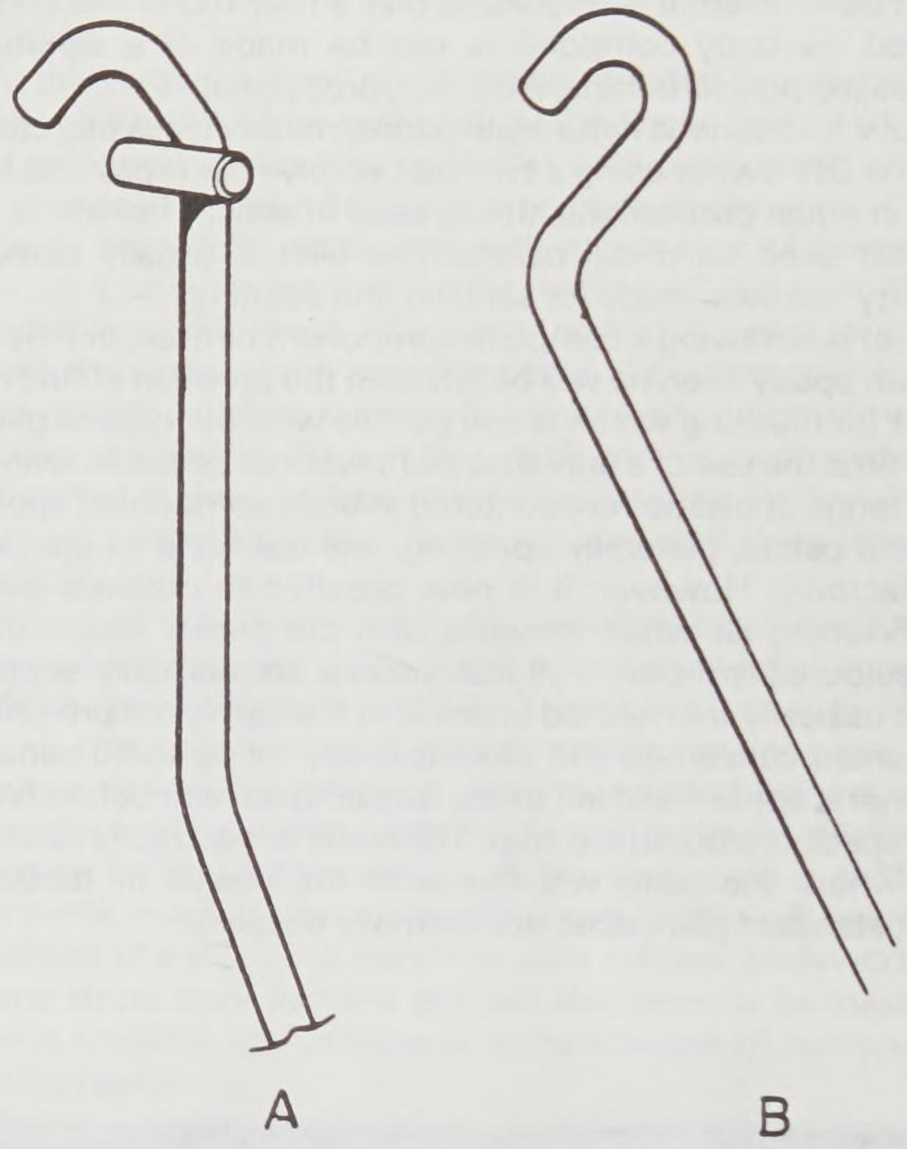


Fig 11.1 Showing early type bonnet prop (B) and later type with stop bar (A) (Sec 10)

10 Bonnet – removal and refitting

1 Prop the bonnet in the open position.
2 Make alignment marks across the hinges and bonnet.
3 With the bonnet supported, remove the hinge-to-bonnet bolts and lift off the bonnet (photo).
4 The bonnet hinges are bolted to the scuttle side members.
5 Refit the bonnet in reverse order and if adjustment is required proceed as follows.
6 Remove the bonnet striker.
7 Loosen the hinge bolts on the scuttle and adjust the bonnet so that it lies 2 to 3 mm below the level of the wings.
8 Check that the two fixed rubber buffers in the bonnet are fitted to the innermost holes and that they are not more than 12.0 mm in height.
9 Adjust the buffers in the front cross panel so that the bonnet will lie level with the tops of the wings at the front.
10 Refit the striker, tightening it in its mid-position.

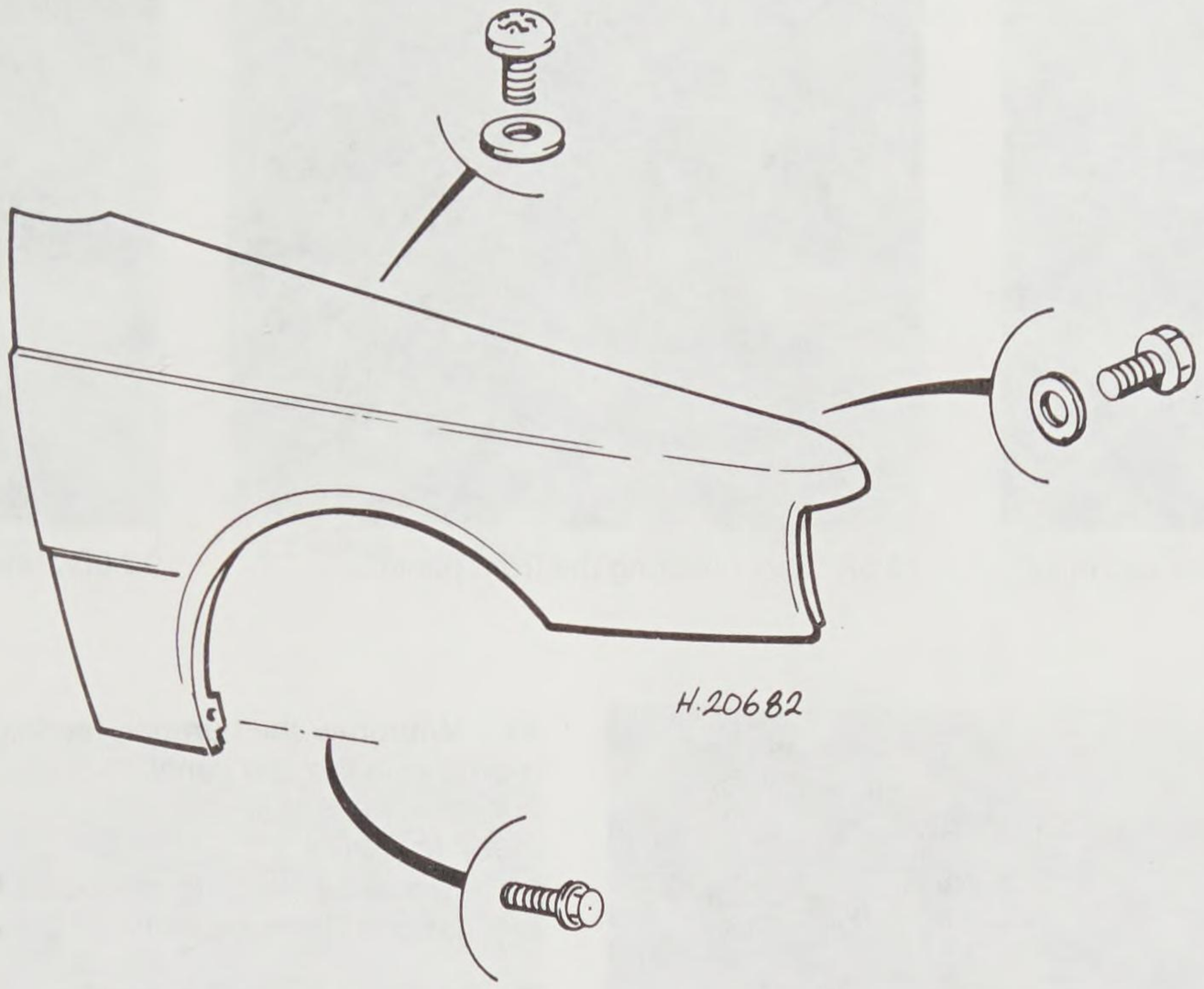
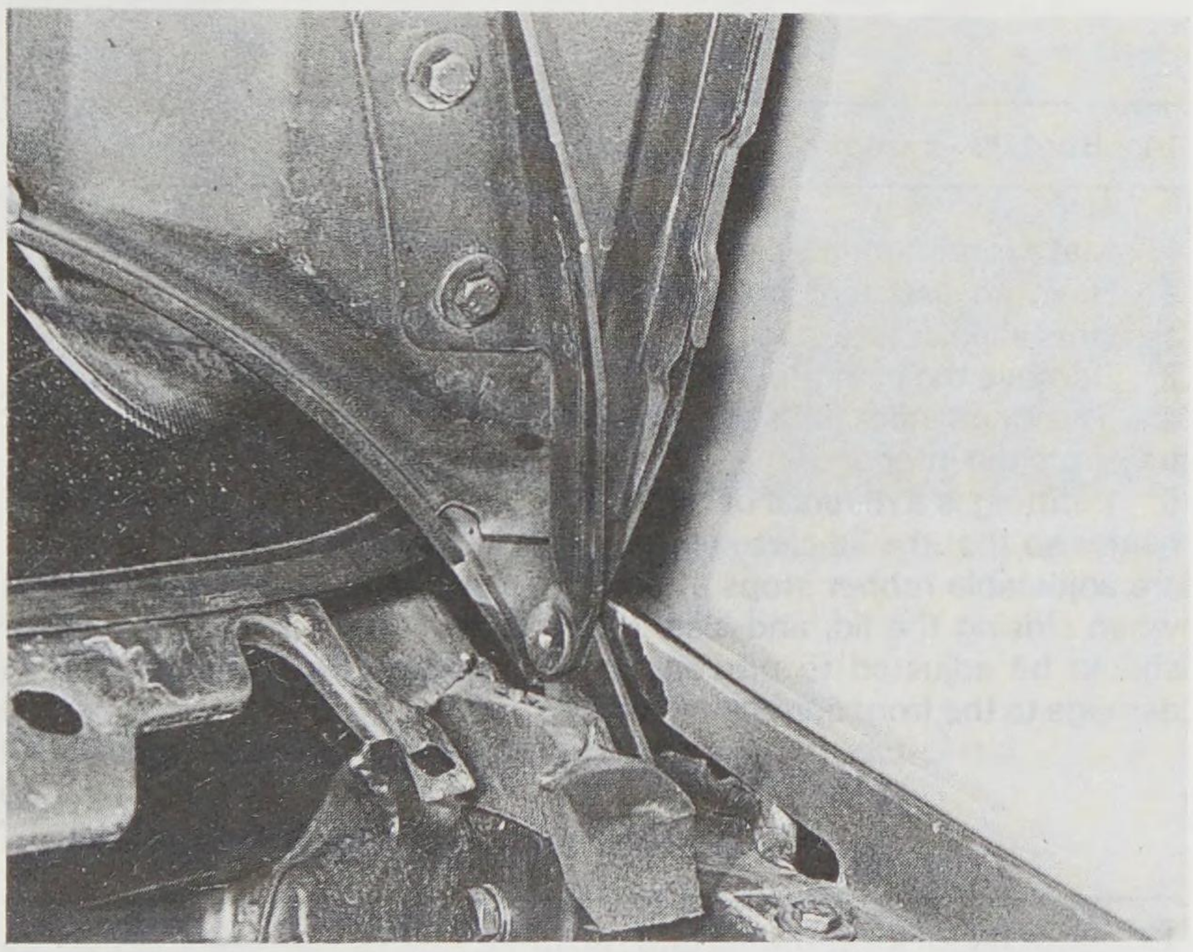


Fig 11.2 Front wing assembly (Sec 11)



10.3 Hinge-to-bonnet bolts (A) and hinge-to-scuttle bolts (B)

11 Close the bonnet and check its alignment, adjusting on the striker as necessary.
12 If the striker is adjusted to its uppermost position ensure that the bonnet will not become 'dished' when it is closed or jamming of the release lever may occur.
13 If this is the case, adjust the bonnet slightly higher.
14 Note that the bonnet can be propped open in an intermediate position or in a full vertical position as required for servicing. Later props have a stop welded to them to prevent damage to the bonnet.

11 Front wing – removal and refitting

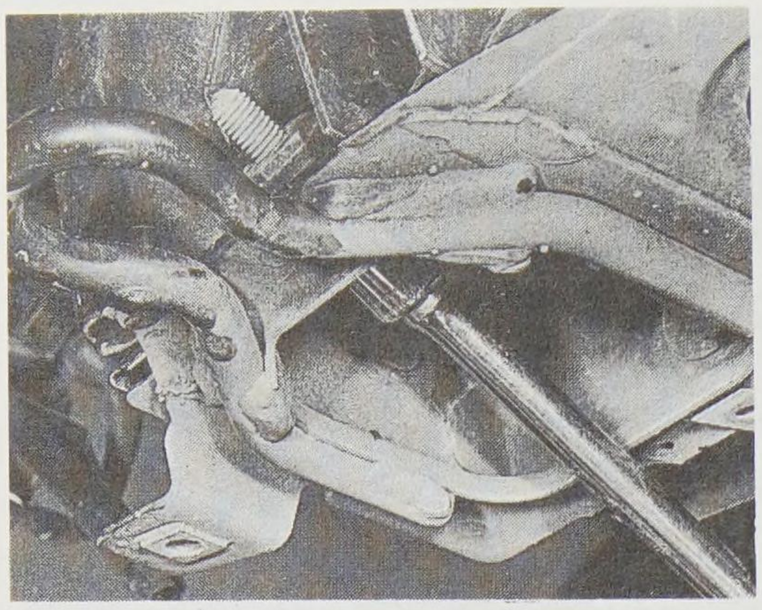
1 The front wing is bolted to the inner framework.
2 Remove the front indicator lamp as described in Chapter 12.
3 Remove the wheel arch liners as described in Section 66.
4 Remove the front bumper as described in Section 13.
5 Unscrew all the bolts along the top inner edge of the wing panel, and from the lower rear arch support bracket.
6 Cut the wing away from the mastic sealer and ease it from the vehicle.
7 Refitting is a reversal of removal, applying anti-corrosion treatment and underseal to the inside of the new wing panel before fitting, and finish the outer surface as described in Section 4.

12 Front panel assembly – removal and refitting

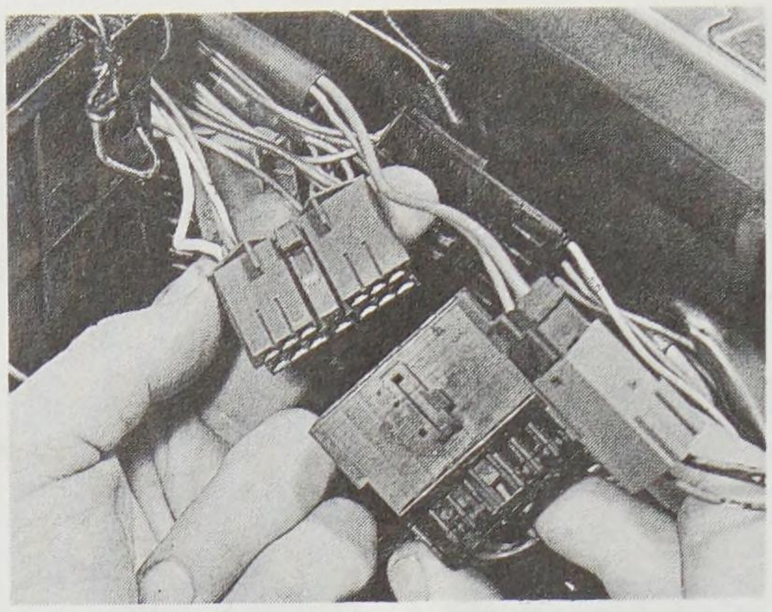
Note: *The complete front panel, including the headlamps and bumper, can be removed from the front of the vehicle, giving excellent access for engine removal/refitting.*
1 Open the bonnet and disconnect the battery negative terminal.
2 Disconnect the bonnet release cable (Section 9).
3 Remove the lower wheel arch liners.
4 Remove the bumper securing bolts as described in Section 13.
5 Remove the two bolts securing the front panel to the lower cross rail (photo).
6 Disconnect the electrical connectors behind the left-hand headlamp, marking them to identify them for refitting (photos).
7 Where fitted, disconnect the headlamp beam adjusters.
8 Unbolt the earth leads at each end of the front panel.
9 Remove the radiator as described in Chapter 2.
10 Where fitted, disconnect the headlamp washer tubes.
11 Remove the two bolts at each end of the panel (photo).
12 Check that all electrical wiring has been disconnected and withdraw the complete front panel assembly.
13 Refitting is a reversal of removal.
Note: *On vehicles with air conditioning, the bolts securing the condenser and reservoir to the front panel must be removed. Where the front panel assembly is being removed for engine removal, the compressor must also be unbolted from the engine which will then allow the complete assembly to be moved back for engine removal. Do not disconnect any refrigerant pipelines unless the system has been discharged.*

13 Bumpers – removal and refitting

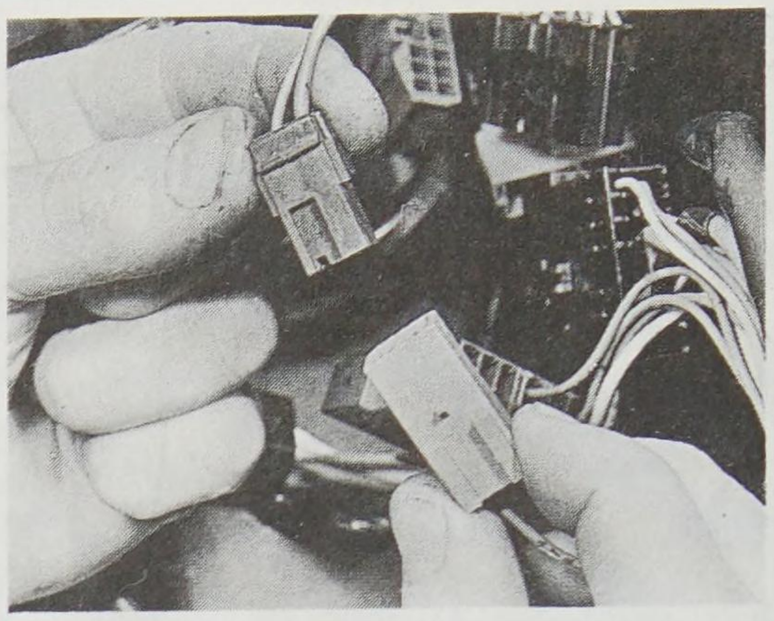
Front (all models)
1 Remove the lower liners from the front wheel arches.
2 Unbolt the bumper front mounting (photo).
3 Remove the bolt from the side bracket (photo).



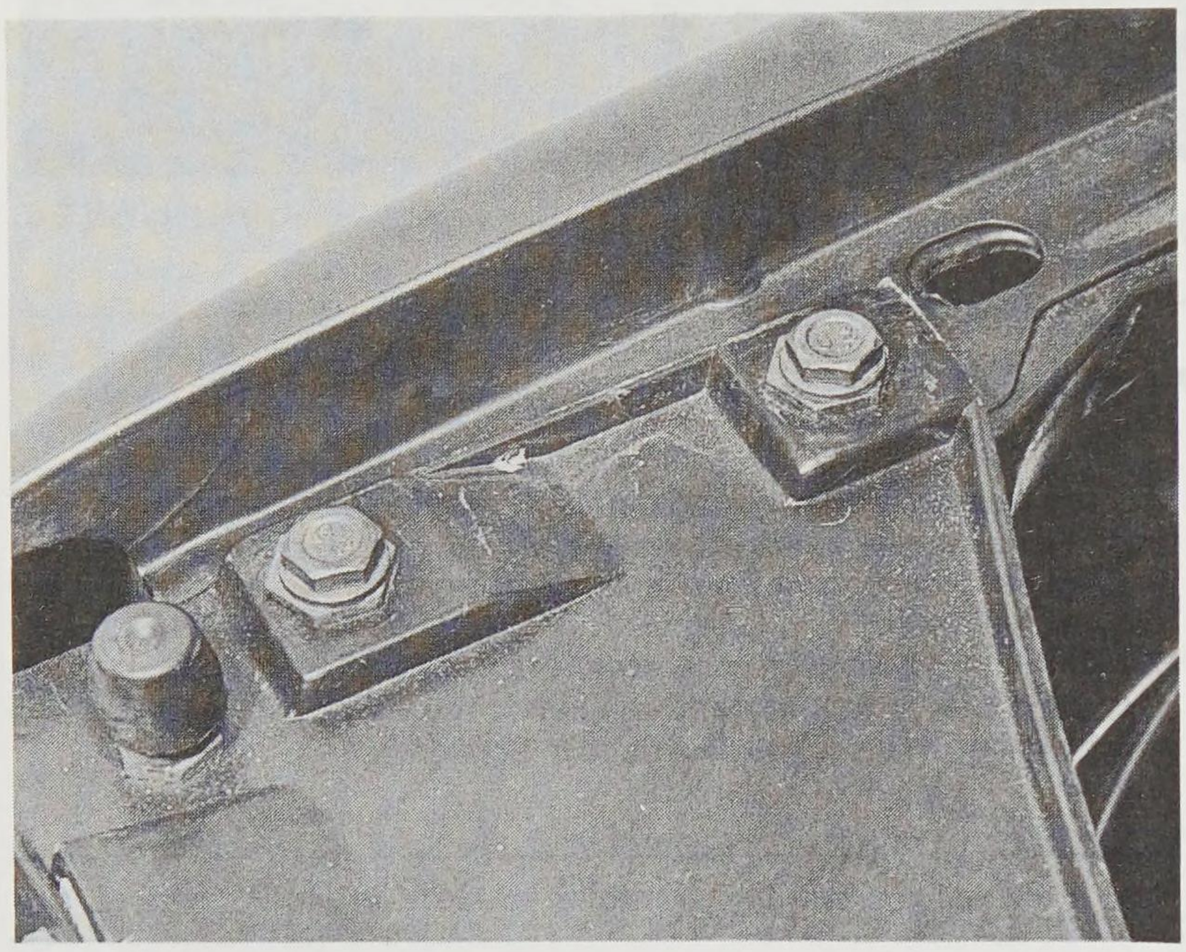
12.5 Removing a front panel lower securing bolt



12.6A Disconnecting the front panel ...



12.6B ... electrical connections



12.11 Front panel end bolts

4 Unscrew the three Torx head screws along the underside (photo).
5 Disconnect the front fog lamps, where fitted.
6 Withdraw the bumper sufficiently to allow disconnection of the headlamp washer tubing, where fitted.
7 Withdraw the bumper.

Rear (Saloon)

8 Remove the rear wheel arch lower liners.
9 Unscrew the bumper side fixing bolts under the liners.
10 Remove the two bolts from the underside of the bumper.
11 Open the boot and disconnect the rear lamp unit multi-plugs.
12 Pull back the boot carpeting and remove the bolts securing the bumper to the boot floor.
13 Withdraw the bumper, feeding the electrical harness through the grommet in the rear panel.

Rear (Estate)

14 Proceed as for Saloon models, but additionally unhook the exhaust rear hanger. There are no fixing bolts in the boot floor.

Front and rear (all models)

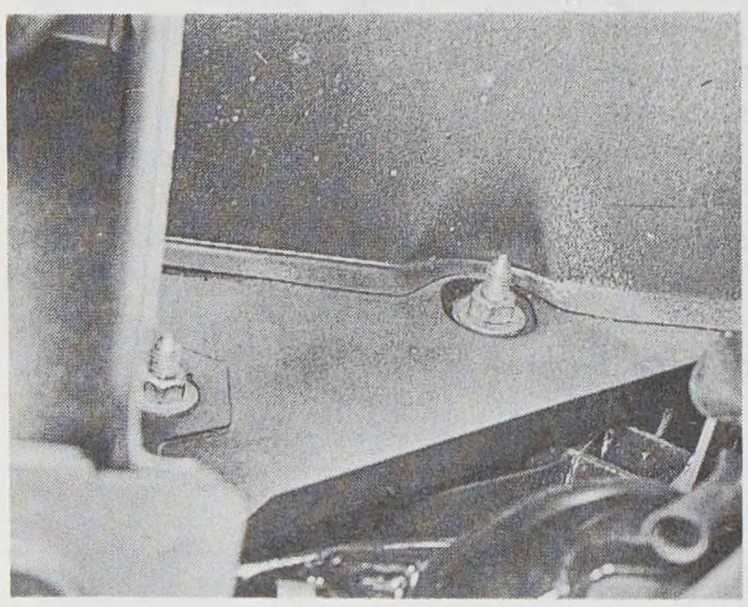
15 Refitting is a reversal of removal.

14 Boot lid – removal and refitting

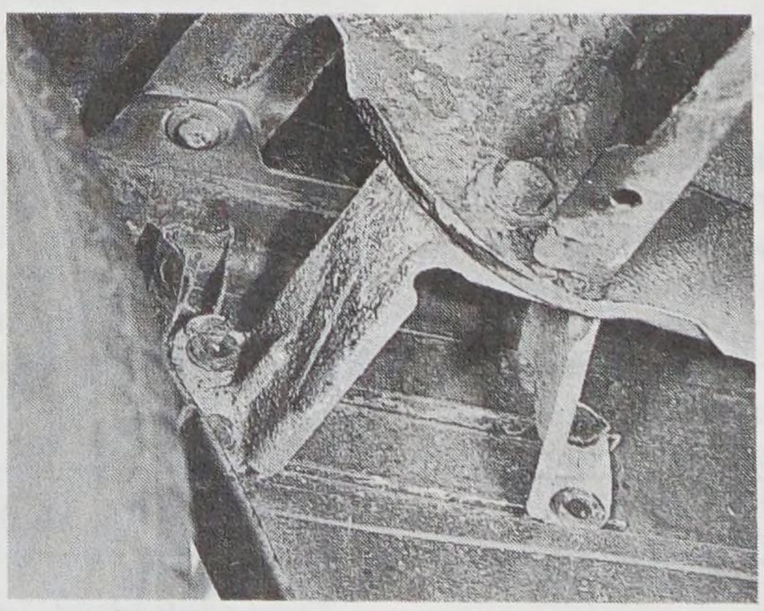
1 Make alignment marks across both hinges and the lid.
2 Have an assistant hold the lid open and disconnect the spring assisters at each side (photo).
3 Remove the hinge-to-lid securing bolts and lift off the lid (photo).
4 The hinge inner bolts are accessible after removing the rear parcel tray from the interior of the vehicle.
5 Refitting is a reversal of removal, adjusting the boot lock latch and hinges so that the lid closes firmly without slamming. Note that there are adjustable rubber stops at each side of the lid to prevent damage when closing the lid, and also under each hinge arm (photo), which should be adjusted to prevent the lid opening too far and causing damage to the front corners of the lid.

15 Boot lid lock – removal and refitting

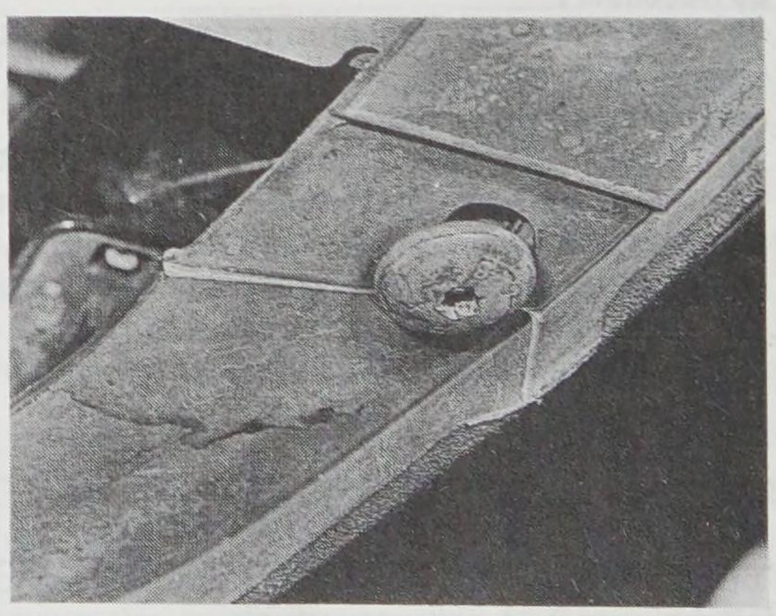
1 Remove the rear trim panel.
2 Remove the boot space inner trim from the rear panel.
3 Drill out the rivets securing the lock to the panel (photo).



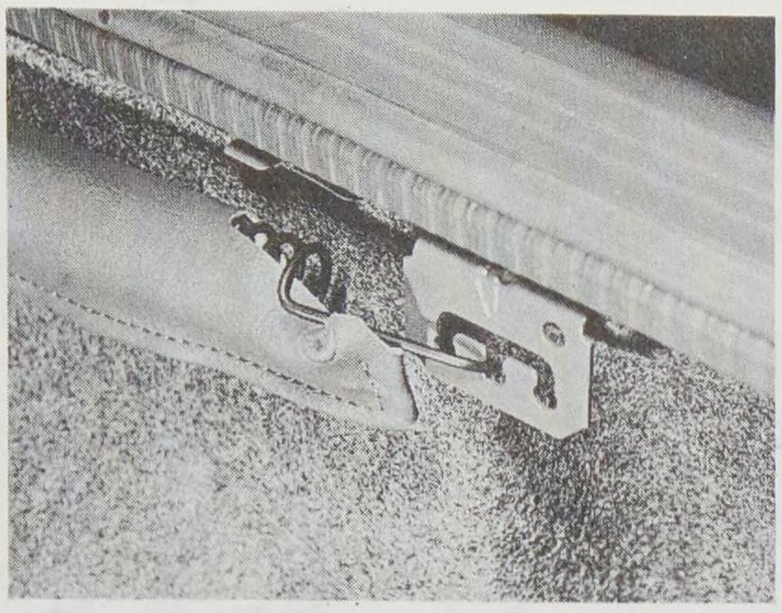
13.2 Bumper front mounting bolts (arrowed)



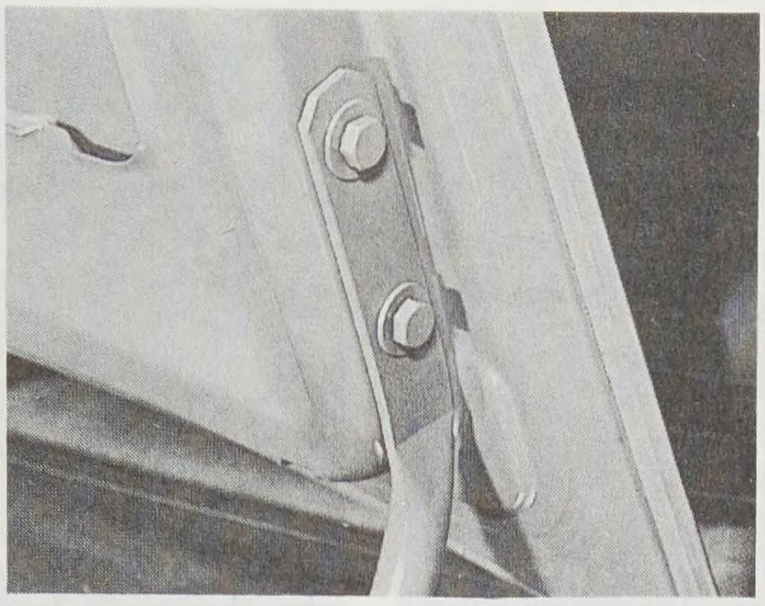
13.3 Bumper side bracket bolt (arrowed)



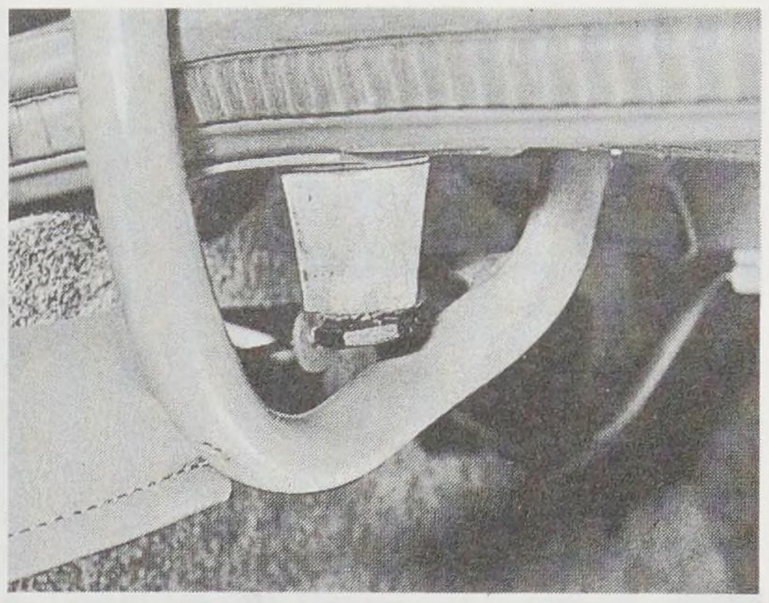
13.4 Torx-headed screw on underside of bumper



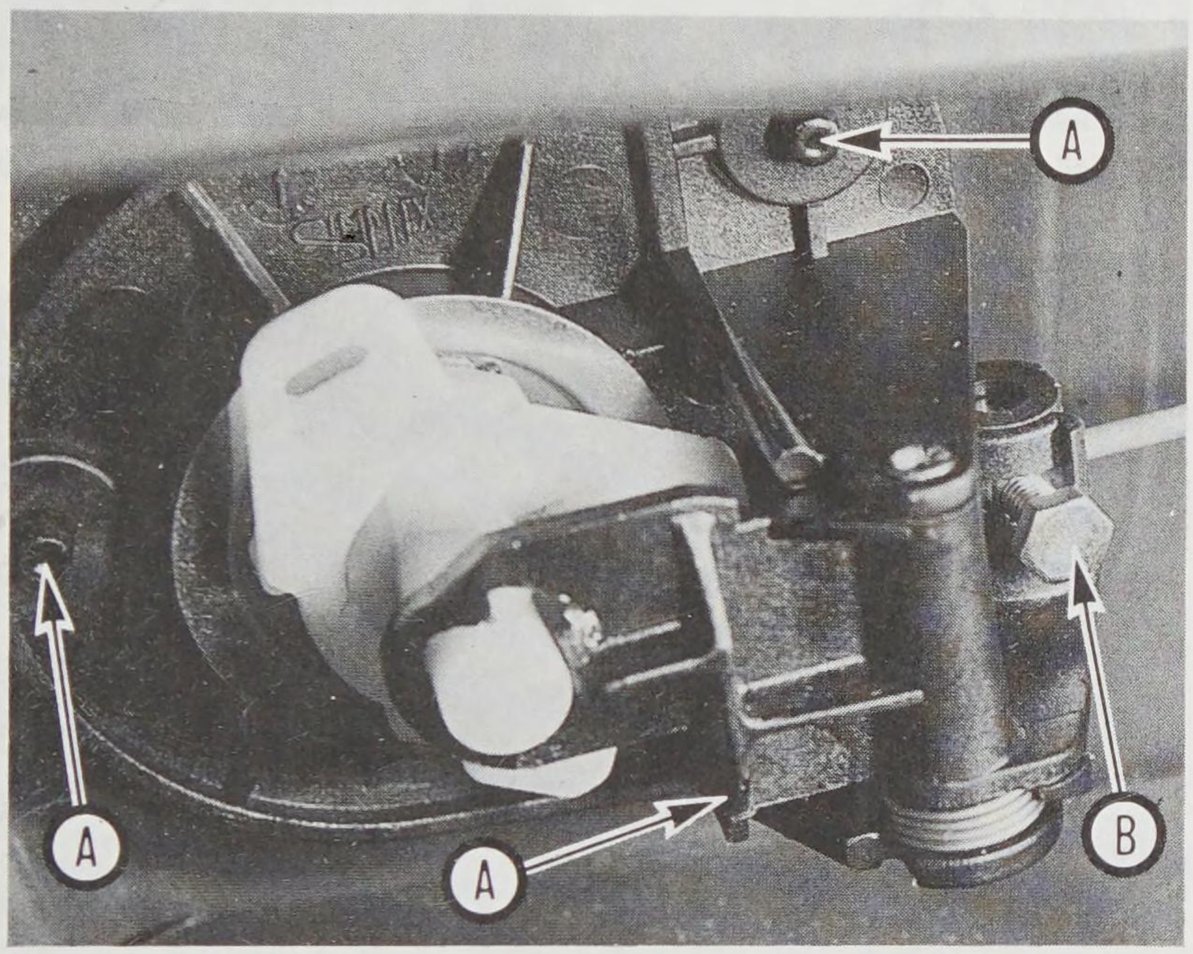
14.2 Boot lid spring assister end fitting



14.3 Hinge-to-lid securing bolts



14.5 Boot lid adjustable rubber stop under hinge arm



15.3 Boot lid lock assembly showing securing rivets (A) and control rod lock bolt (B)

4 Undo the clamp bolt on the lock control rod.
5 Where fitted, release the central lock solenoid control rod.
6 Withdraw the lock.
7 Refit in reverse order.

16 Boot latch and striker – removal and refitting

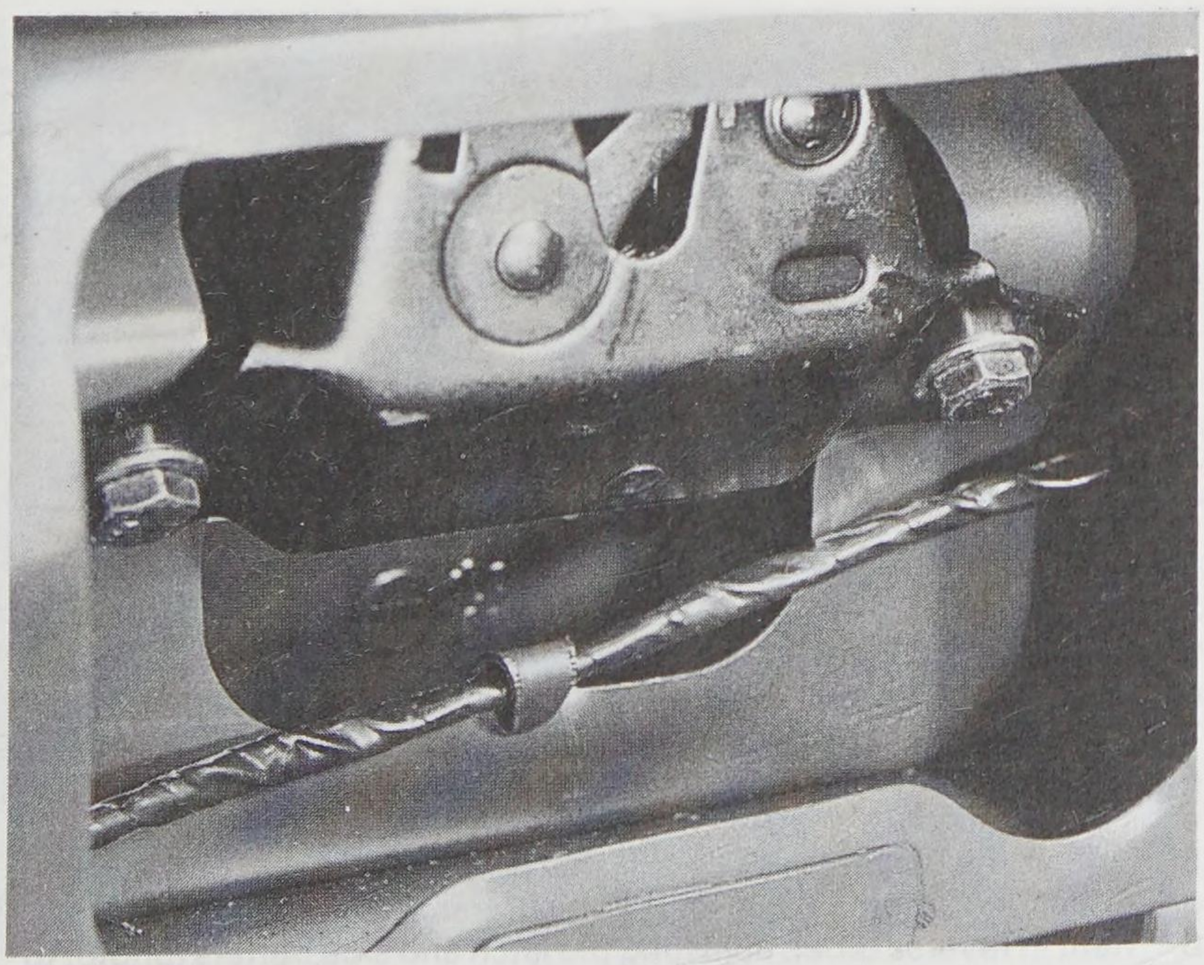
1 Open the boot and remove the trim panels from the rear cross panel.
2 Remove the bolts securing the latch to the rear panel, unhook the control rod and withdraw the latch (photo).
3 The boot striker is bolted to the boot lid (photo).
4 Refitting is a reversal of removal, adjusting the latch and striker to achieve firm closure of the lid as described in Section 14.

17 Rear spoiler – removal and refitting

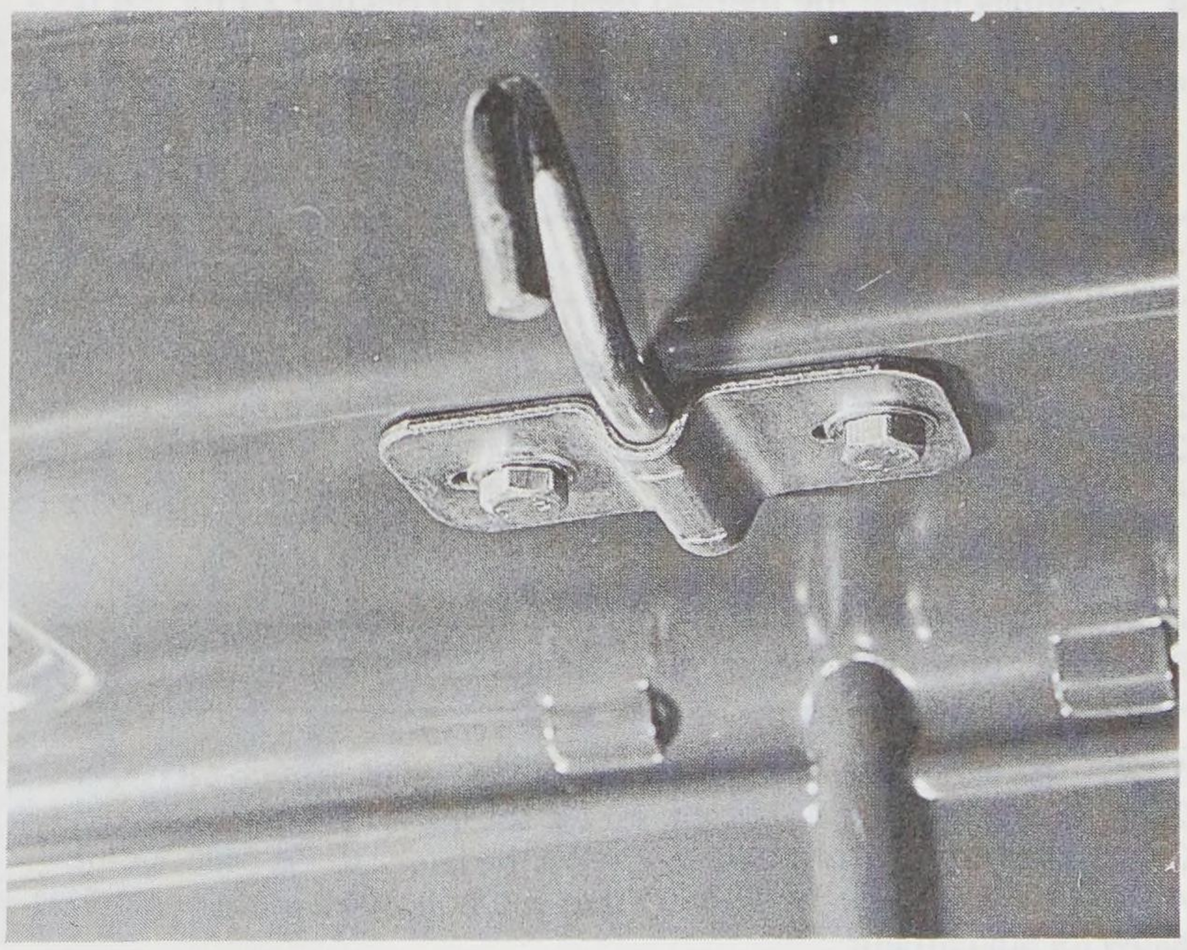
1 The rear spoiler, where fitted, is secured to the boot lid by nuts, accessible from the underside of the lid.
2 Removal and refitting of the spoiler is self-evident.

18 Tailgate trim panel (Estate) – removal and refitting

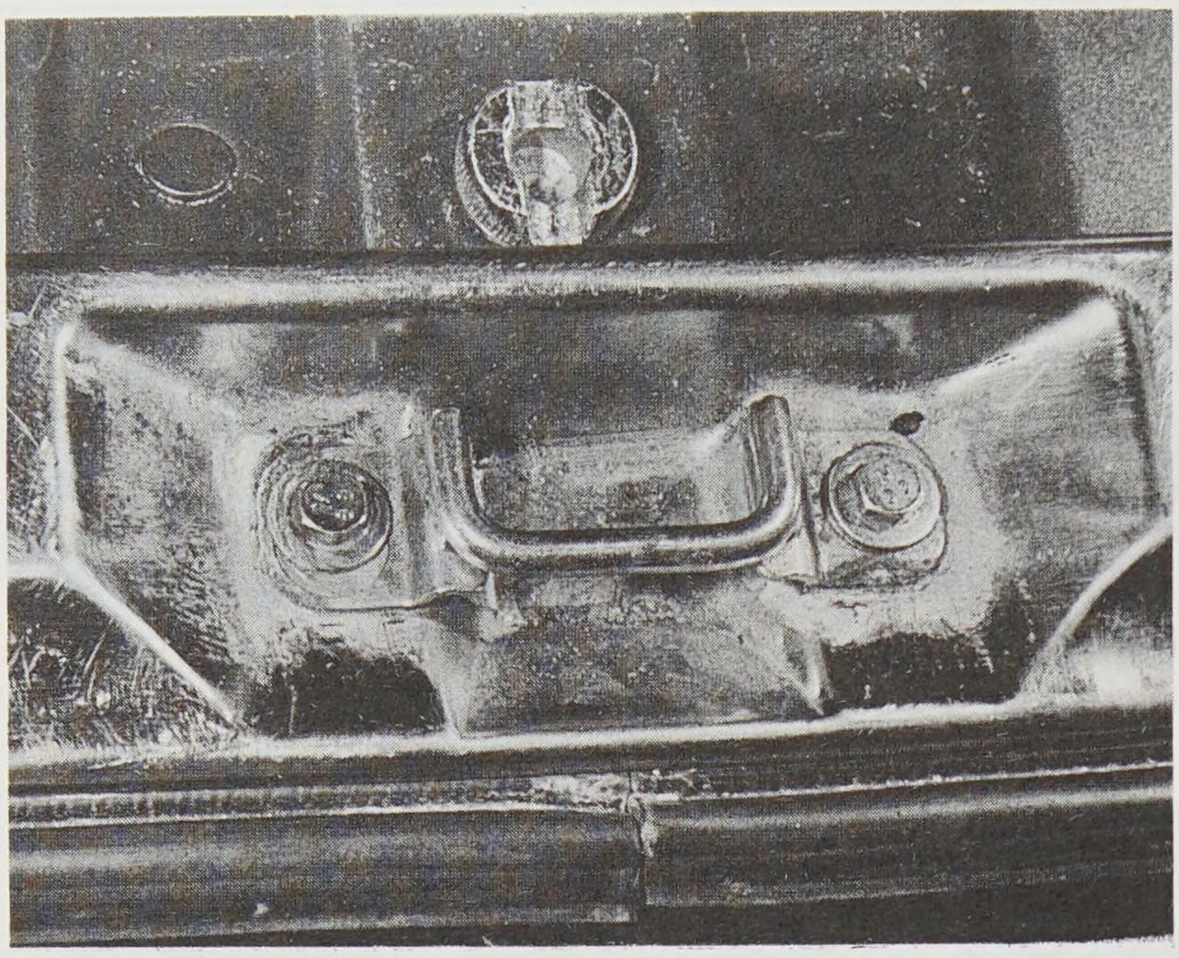
1 Open the tailgate.
2 Remove the screws from, and lift off, the plastic capping strip (photo).



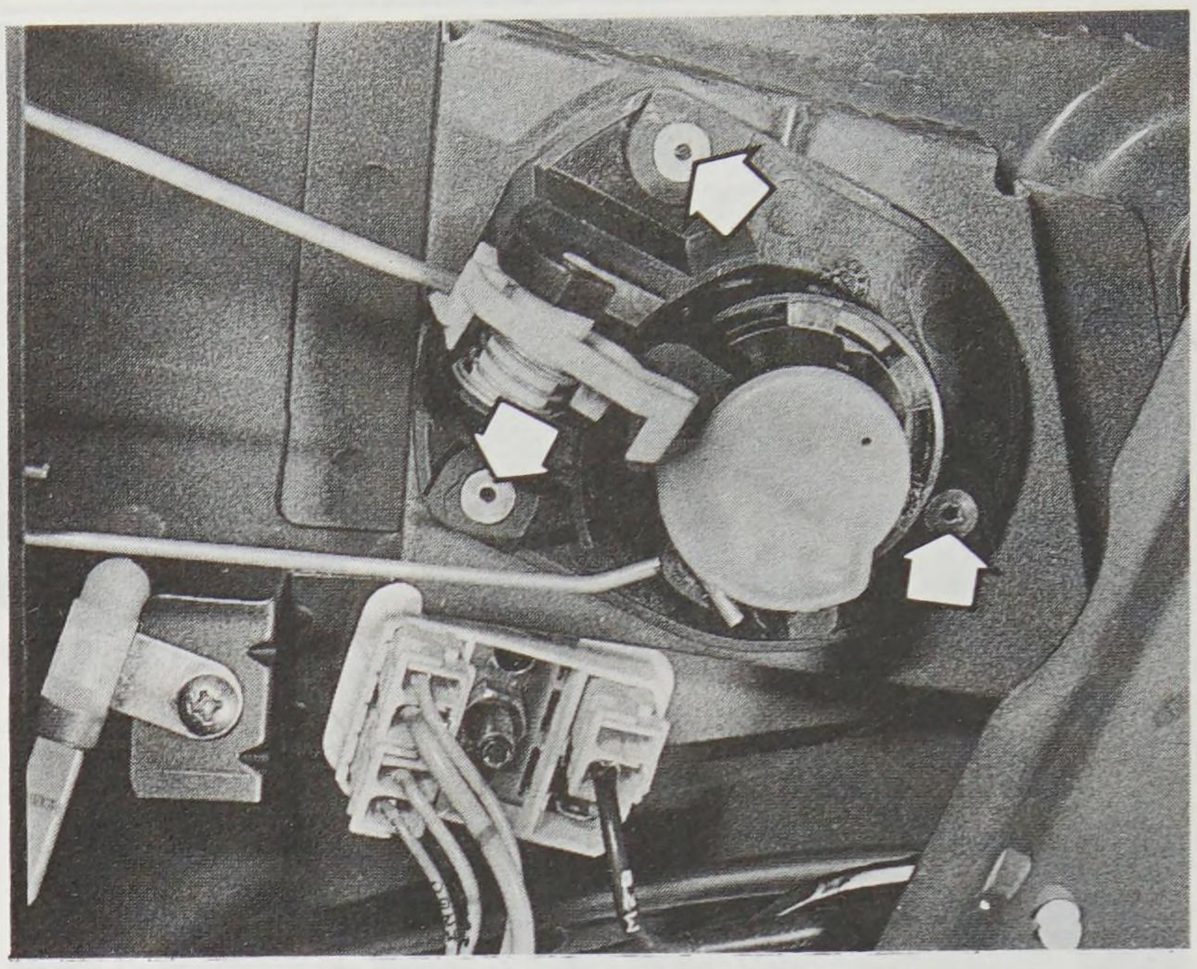
16.2 Boot latch assembly



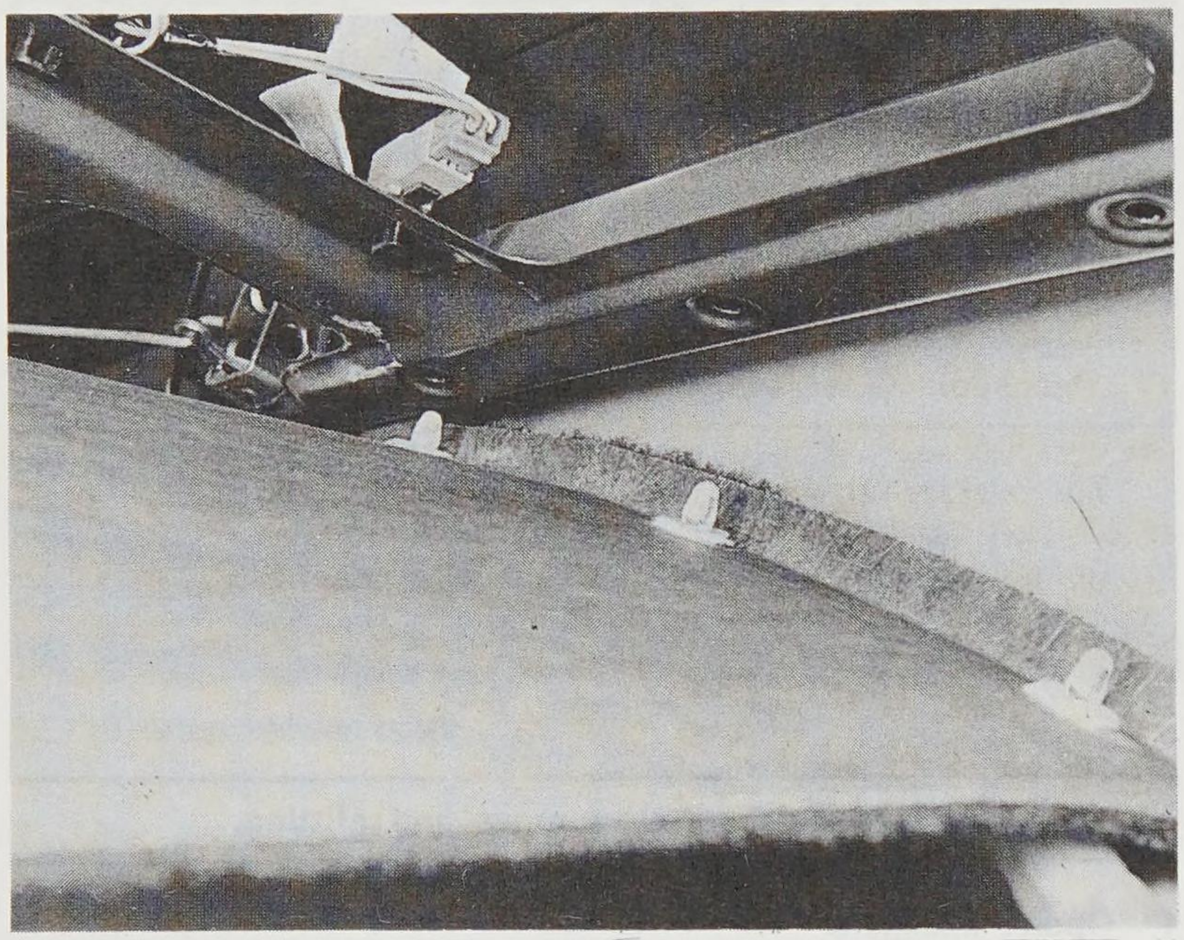
16.3 Boot striker



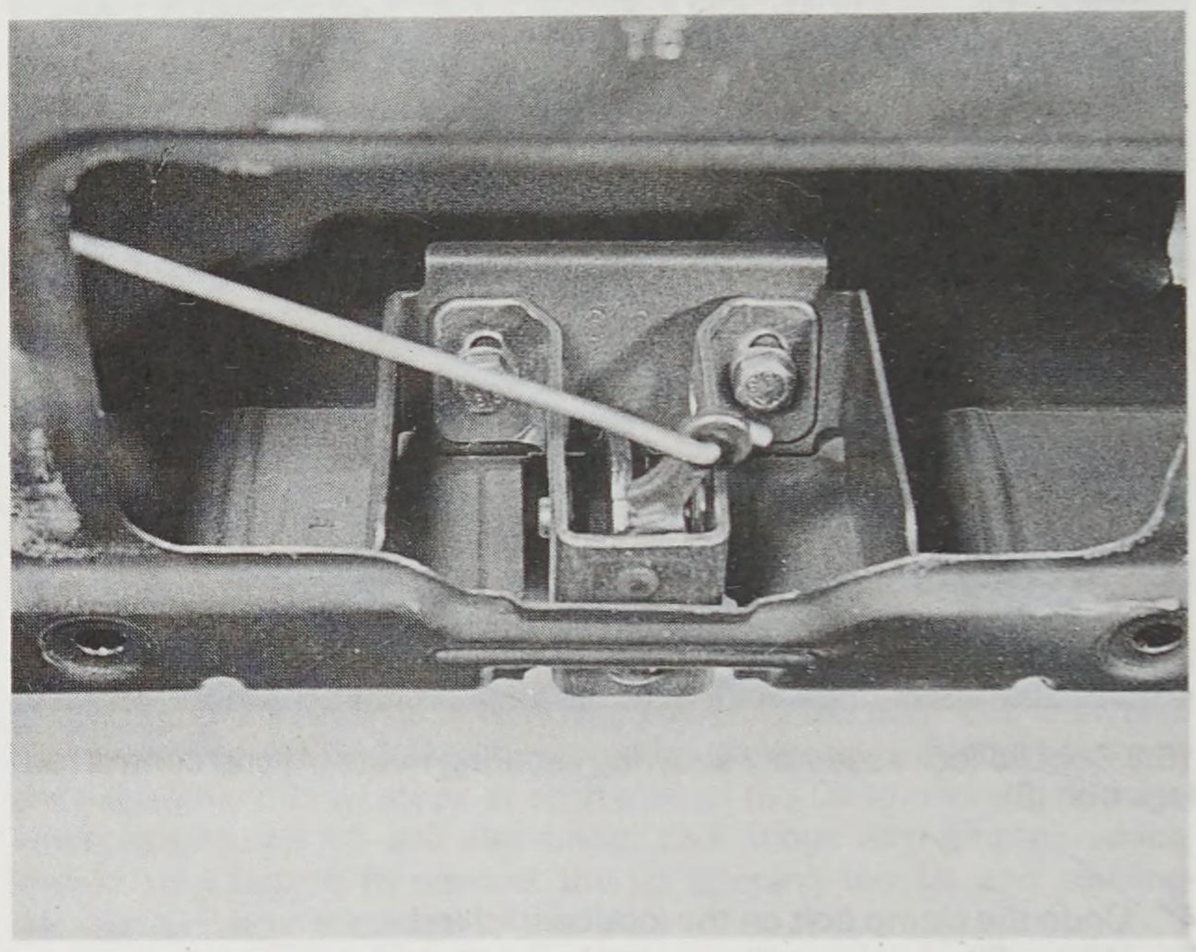
18.2 Removing the plastic capping strip from tailgate trim panel



19.2 Tailgate lock assembly showing rivets (arrowed)



18.3 Removing the trim panel



20.2 Tailgate latch assembly

3 Carefully (using the method described in Section 24 for the door trim panel) prise off the carpeted trim panel (photo).
4 Refit in reverse order.

19 Tailgate lock (Estate) – removal and refitting

1 Remove the tailgate trim panel as described in Section 18.
2 Drill out the rivets securing the lock to the tailgate (photo).
3 Unhook the control rod and withdraw the lock.
4 Refit in reverse order.

20 Tailgate latch (Estate) – removal and refitting

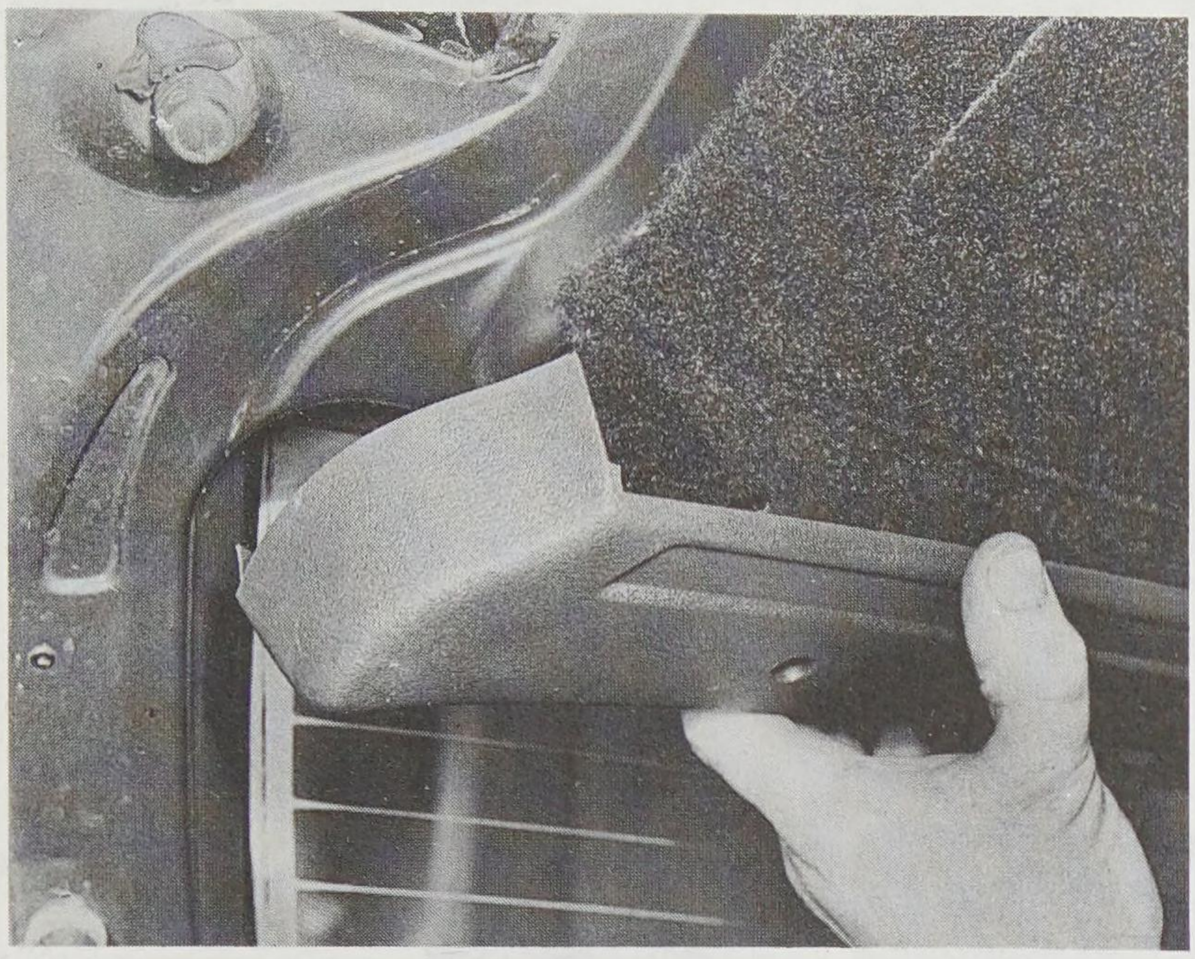
1 Remove the tailgate trim panel as described in Section 18.
2 Unbolt the latch from the bracket (photo).
3 Unhook the control rod and remove the latch.
4 Refit in reverse order, noting that the bolt holes are elongated to allow for adjustment.
5 The striker is bolted to the load space floor (photo).

21 Tailgate struts (Estate) – removal and refitting

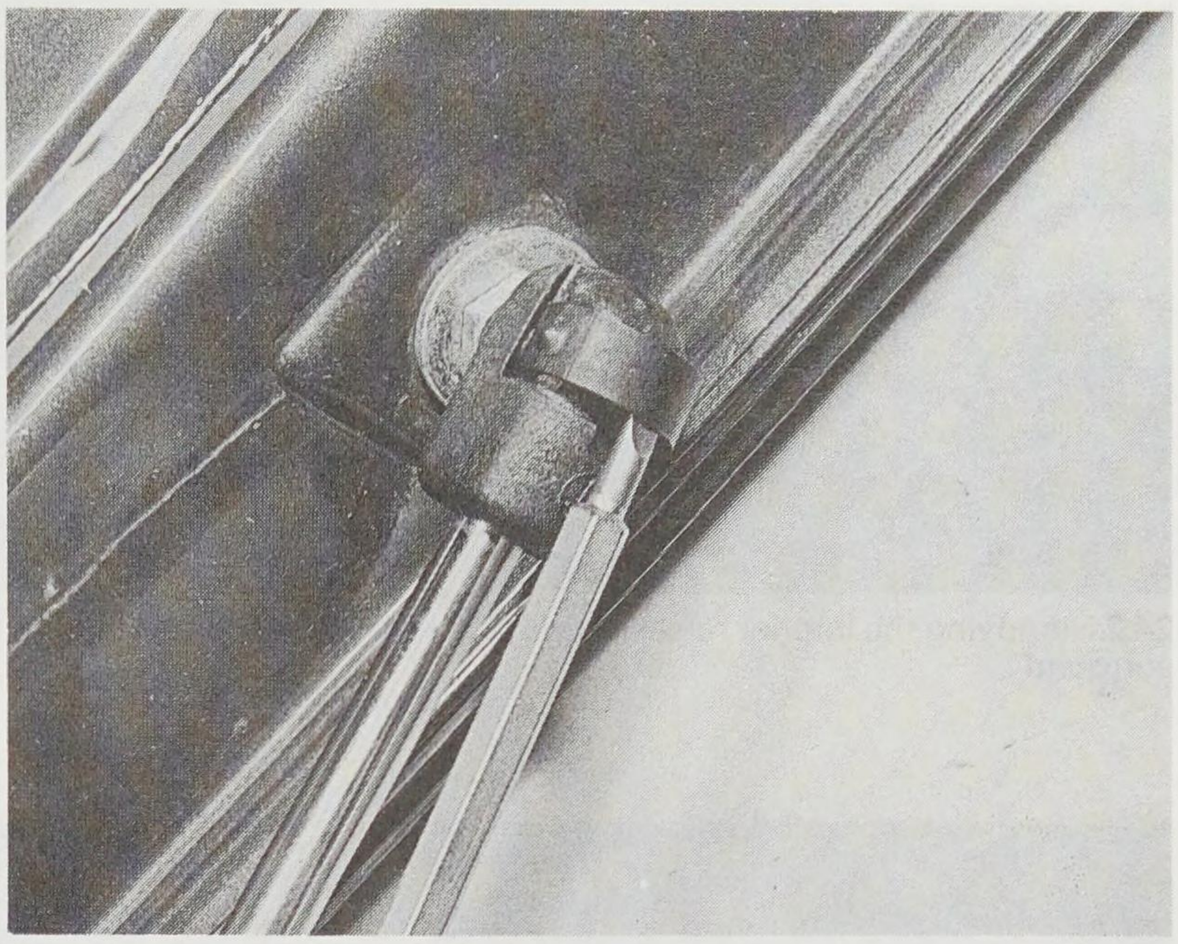
1 Prop open the tailgate with a length of wood.
2 Prise off the clip from the ball-stud (photo).
3 Pull the ball from the stud (photo).
4 Repeat the operation on the lower end of the strut and remove the strut.
5 Refit in reverse order.

22 Tailgate (Estate) – removal and refitting

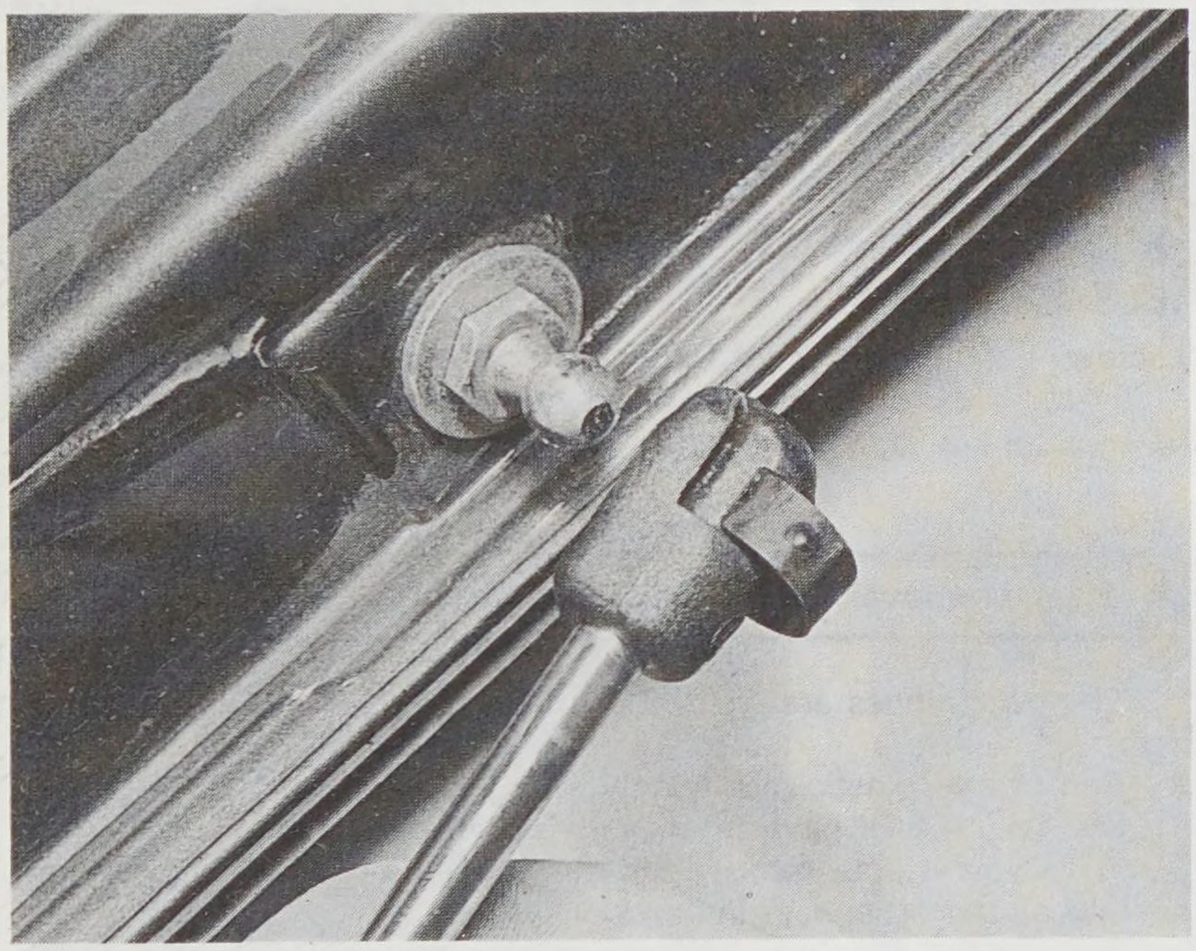
1 Remove the tailgate trim panel as described in Section 18.
2 Disconnect all electrical services to the tailgate. Do not forget the washer tube. The looms must be fed through the two holes at the top corners of the tailgate as it is removed.
3 Make alignment marks across the tailgate hinges.
4 Have assistants support the tailgate, then disconnect the upper ends of the tailgate struts.
5 Unbolt the hinges and remove the tailgate, bearing in mind paragraph 2 above (photo).
6 Refit in reverse order, adjusting the latch and side buffers (photo) to achieve firm closure of the tailgate without undue slamming.



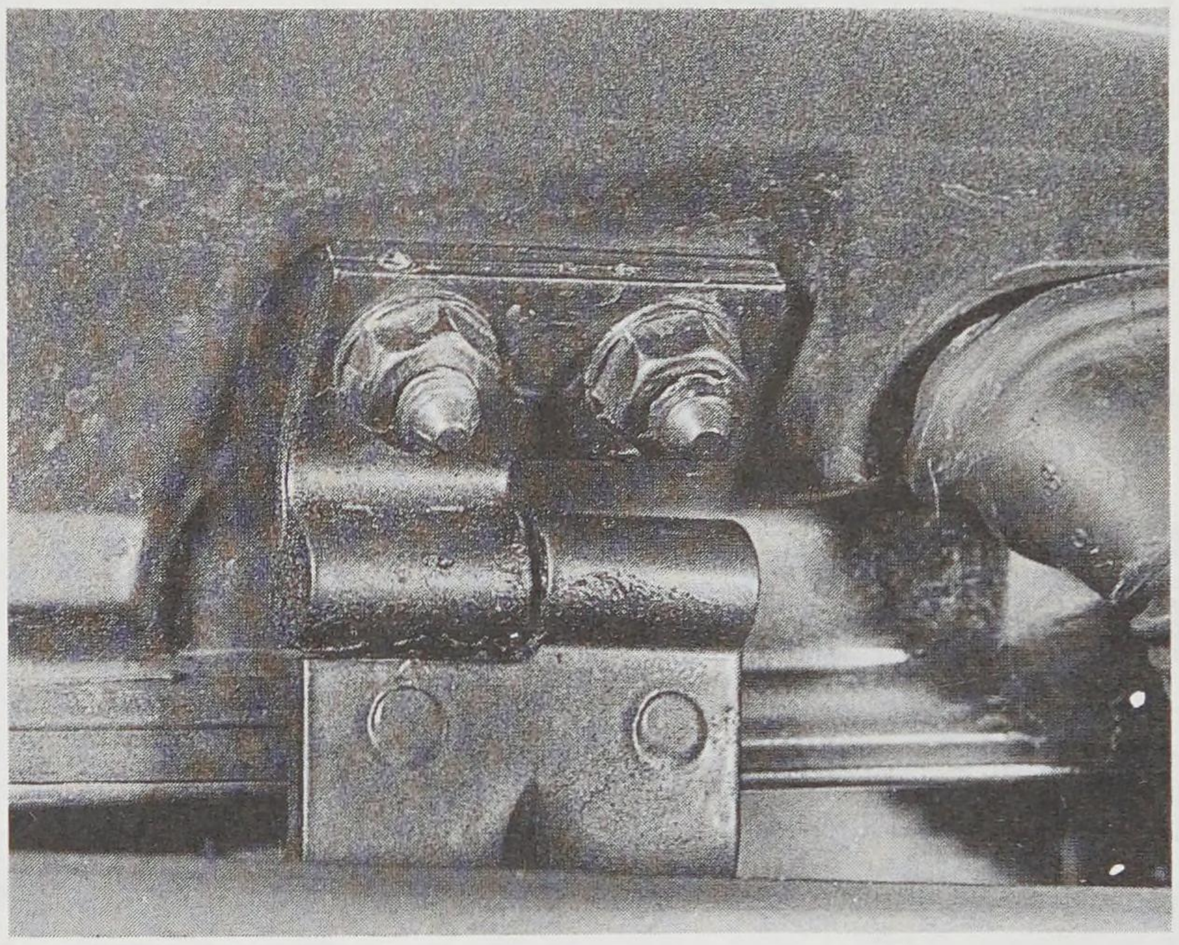
20.5 Tailgate latch striker



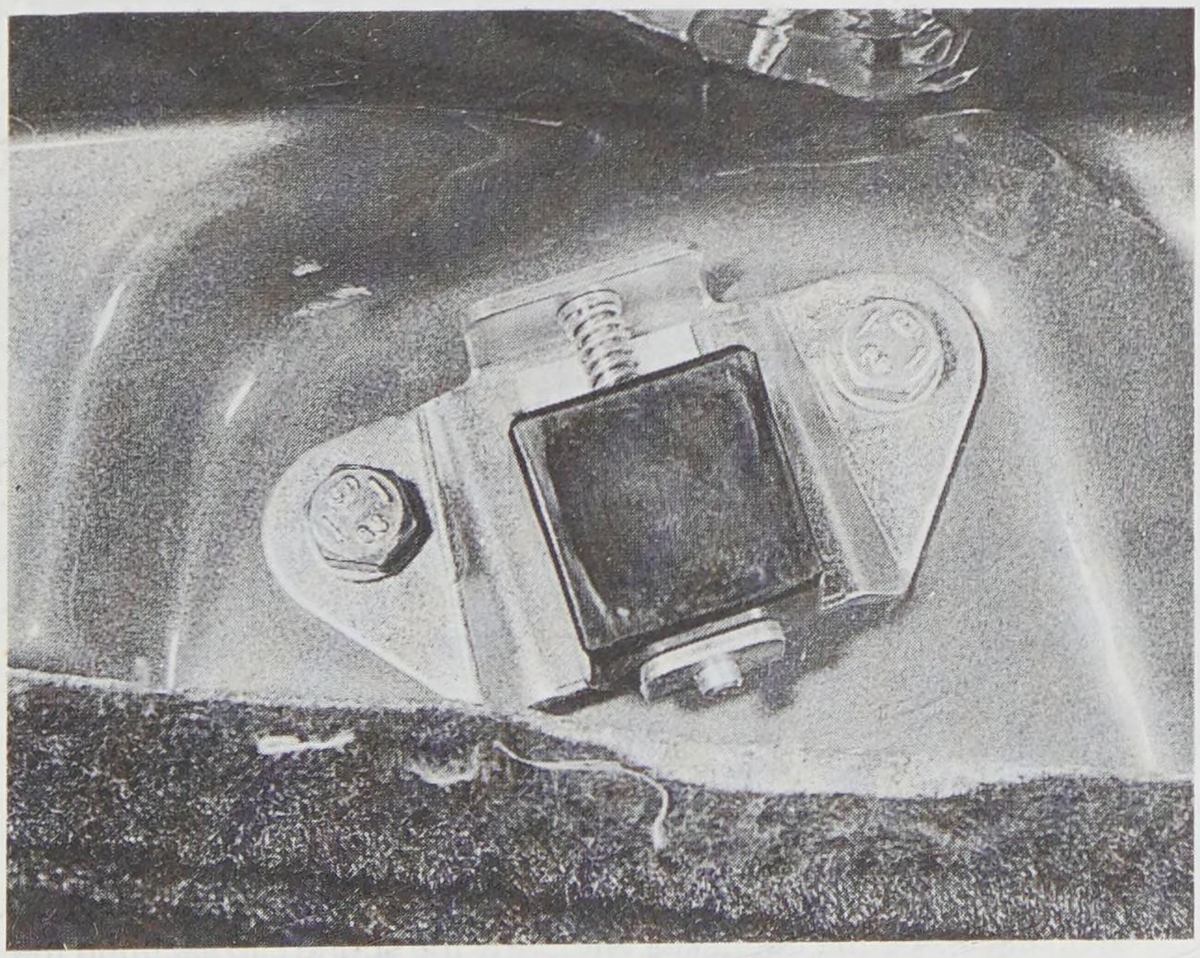
21.2 Prising the clip from the ball-stud



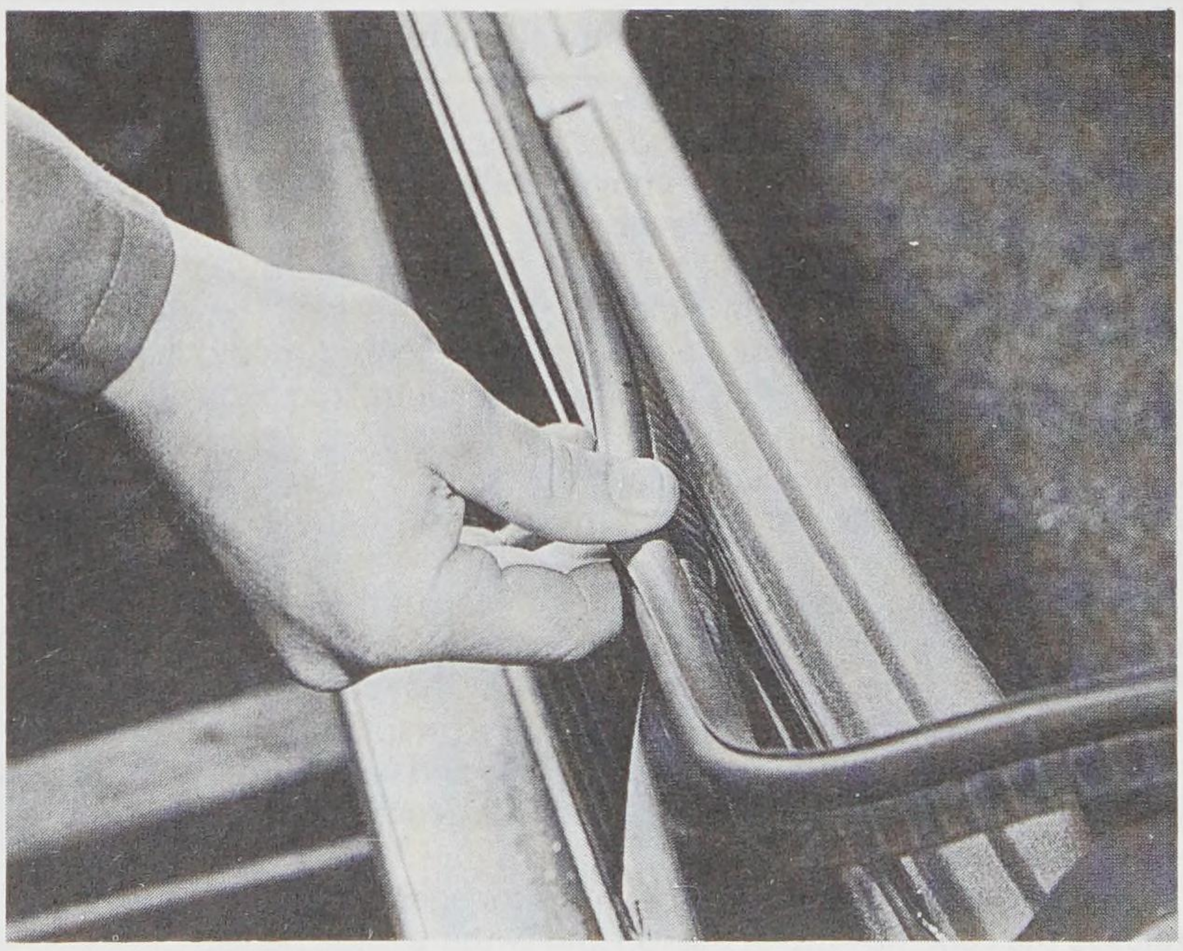
21.3 Pulling the ball from the stud



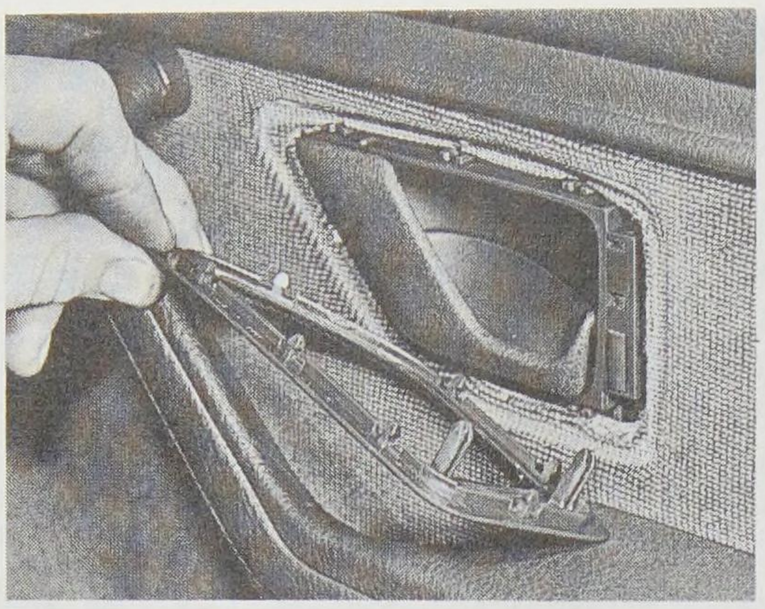
22.5 Tailgate hinges



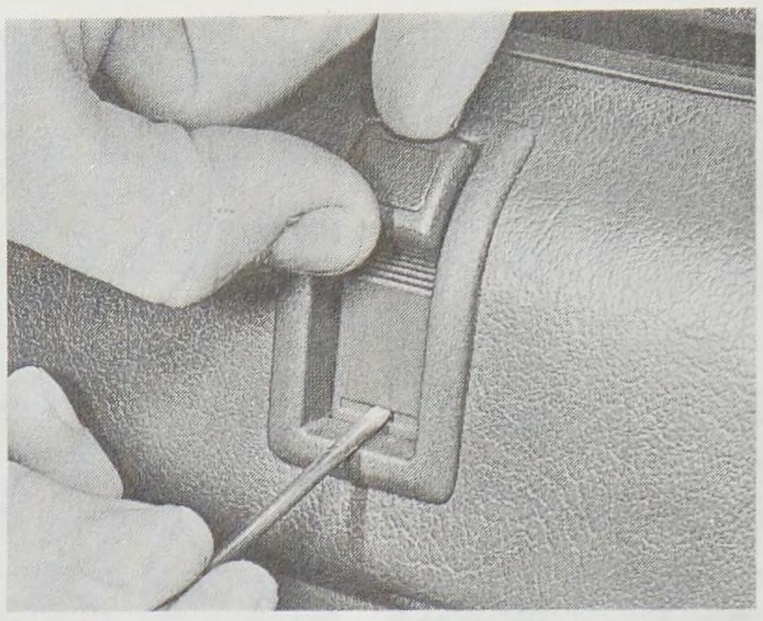
22.6 Tailgate side buffer



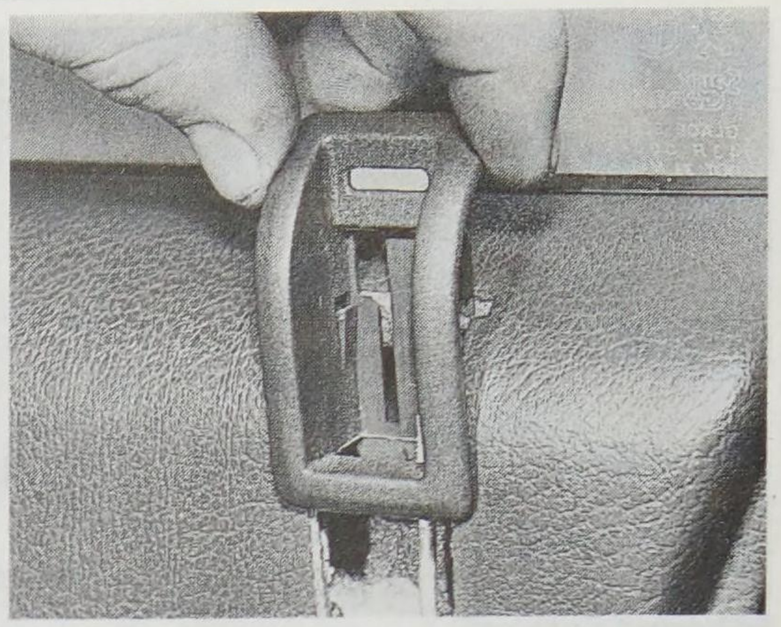
23.1 Pulling up the boot weather strip



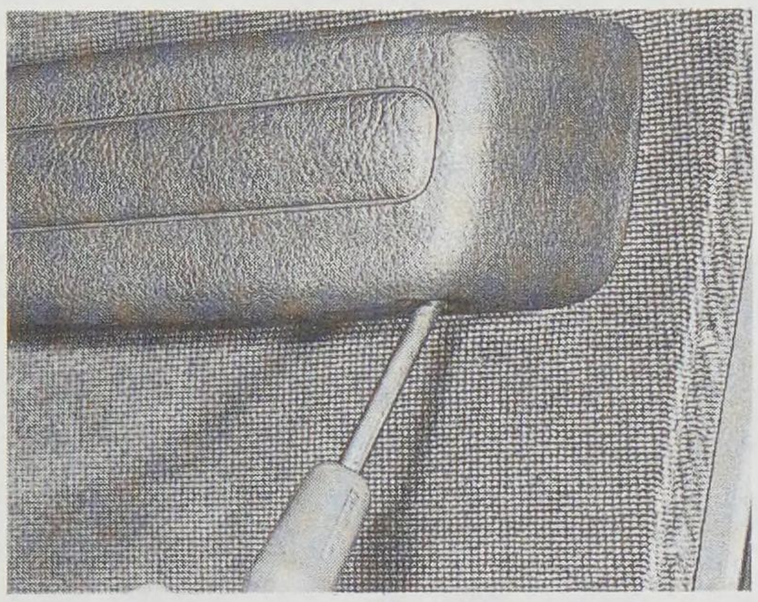
24.2 Removing the interior release handle surround



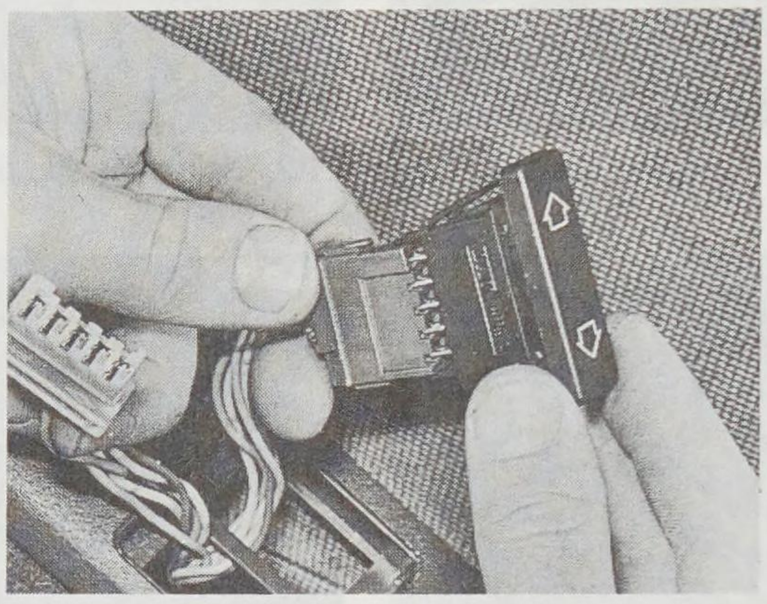
24.4 Depressing the control rod tab



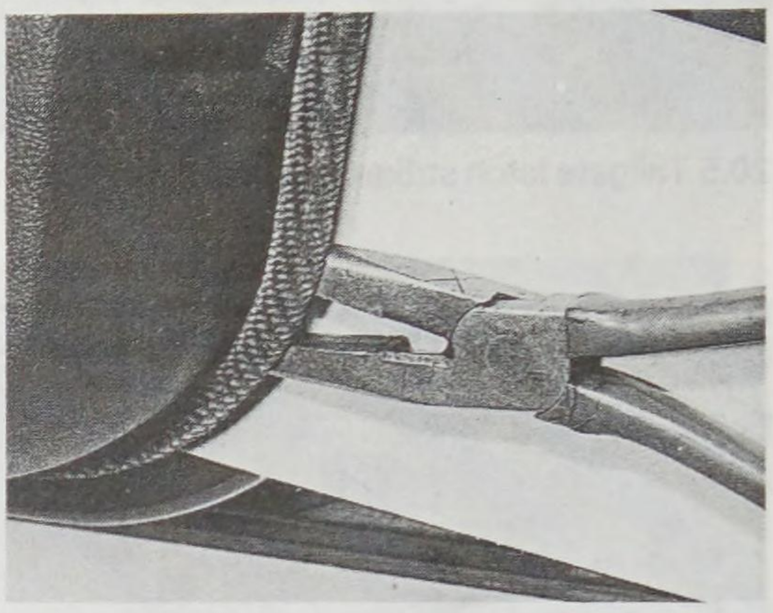
24.5 Pulling out the remote lock finisher



24.7 Disconnecting an electric window switch



24.8 Removing an armrest screw



24.10 Prising out the door trim securing clips

23 Rear outer trim panel (Saloon) – removal and refitting

1 Open the boot lid and pull up the boot weather strip (photo).
2 Drill out the rivets securing the upper edge of the trim panel to the rear cross panel.
3 Pull the panel outward from the lower plastic clips to remove.
4 Refit in reverse order.

24 Door interior trim panel – removal and refitting

Note: *The procedure for front and rear doors is similar.*
1 If the door trim is being removed for window removal, lower the window by two-thirds of its travel.
2 Prise out the interior release handle surround (photo).
3 Refer to Chapter 12 and remove the radio speaker.
4 Position the lock control button in the unlocked mode, then use a small screwdriver to depress the tab on the control rod and pull the lock button off the rod (photo).
5 Pull out the remote lock finisher (photo).
6 On models with manual windows, pull off the window regulator handle.
7 On models with electric windows, prise out the switches from the door bin console and disconnect them (photo).
8 Prise off the trim panel from the base of the rear view mirror.
9 Remove the screws and lift off the armrest (photo).
10 Using a pair of long-nosed snipe pliers and with a piece of stiff card interposed between them, prise out the door trim securing clips (photo) – see also Section 18.
11 When all the clips have been disengaged, lift the trim panel to release the capping strip at the top and withdraw the panel.
12 Refit in reverse order.

25 Door – removal and refitting

1 The door hinges are welded to the body pillar and bolted to the door.
2 Remove the plastic caps from the hinge pivot pins.
3 Drive out the roll pin from the door check strap (photo).
4 Where applicable, remove the trim panel (Section 24) and disconnect the electrical services in the door.
5 Support the door in the fully open position by placing blocks, or a jack and a pad of rag, under its lower edge.
6 Drive out the hinge pivot pins and remove the door.
7 Refit by reversing the removal operations.
8 Where necessary, the striker on the body pillar may be adjusted to ensure correct closure of the door.

26 Door locks and fittings – removal and refitting

Note: *The procedure for front and rear doors is similar.*
1 Remove the door trim panel as described in Section 24.
2 Carefully remove the moistureproof sheet by peeling it up from the bottom. If it becomes damaged it should be renewed.

Interior release handle

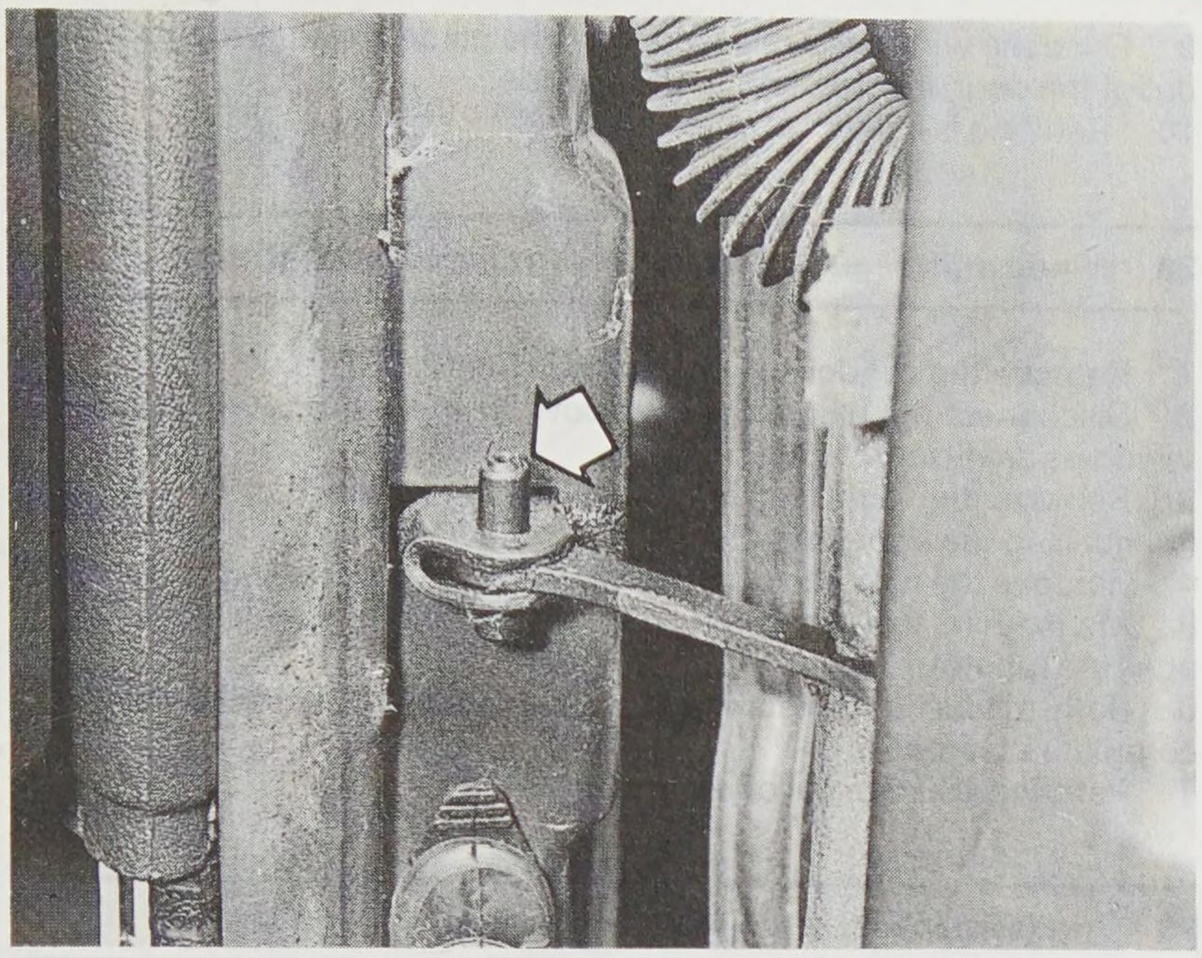
3 Prise out the plastic handle assembly.
4 Unhook the handle from the control rod (photo).

Exterior release handle

5 Undo the two nuts securing the handle to the door (photo).
6 Unhook the handle from the link rod and remove the handle.

Door lock

7 Working inside the door skin, withdraw the spring clip securing the lock to the outer door panel (photo).



25.3 Door check strap roll pin (arrowed)

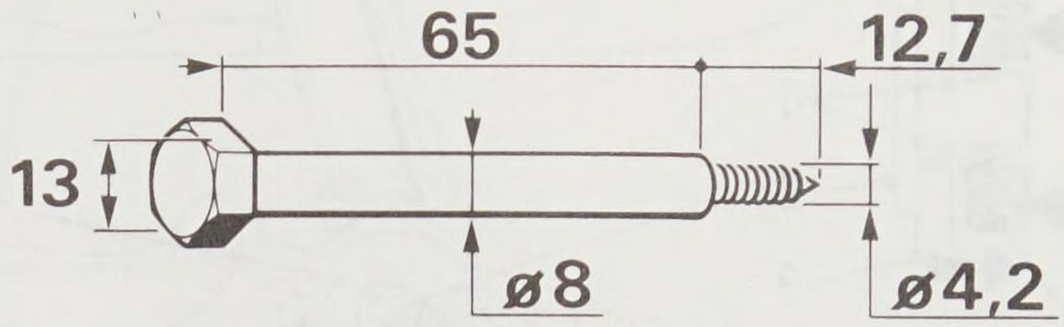


Fig 11.3 Bolt dimensions (in mm) for door lock removal without removing trim panel (Sec 26)

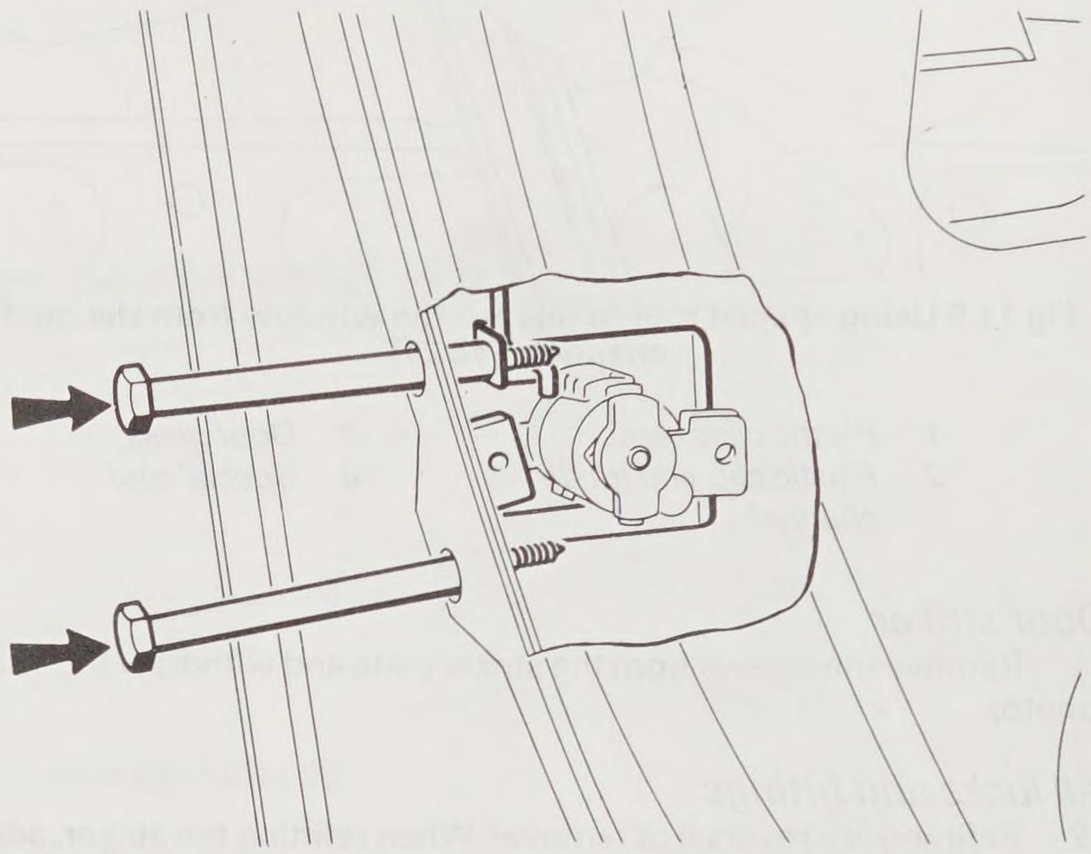


Fig 11.4 Method of releasing door lock spring clip (Sec 26)

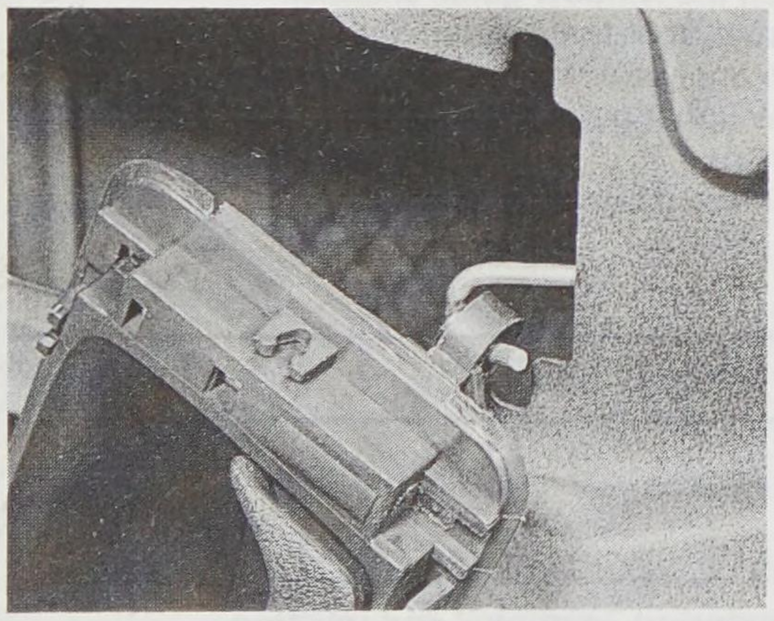
8 From outside the vehicle, pull the lock out and disconnect the link rod and remove the lock (photo).

Note: *If two bolts are made up to the dimensions shown in Fig. 11.3 the lock retaining spring clip can be disengaged without removing the door trim panel. The bolts are screwed into the clip and pushed inward to release the clip (Fig. 11.4).*

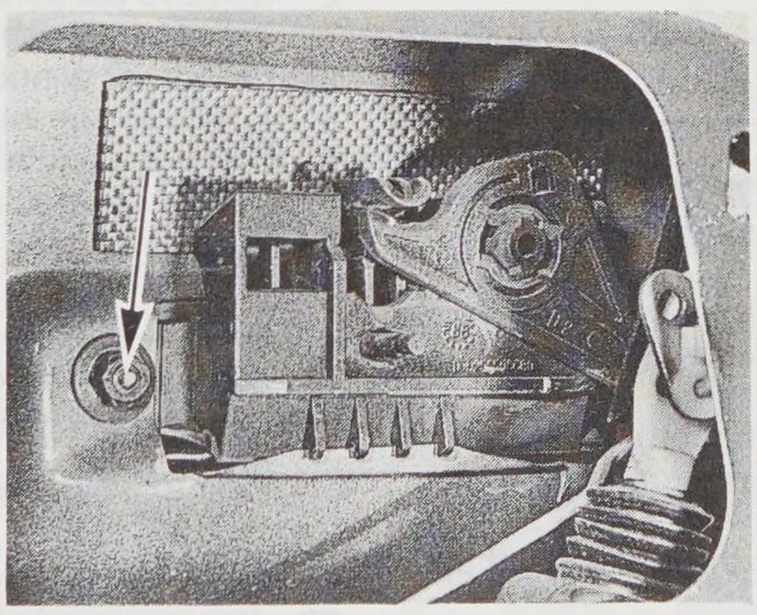
Door latch

9 Remove the screws securing the latch to the door edge (photo).

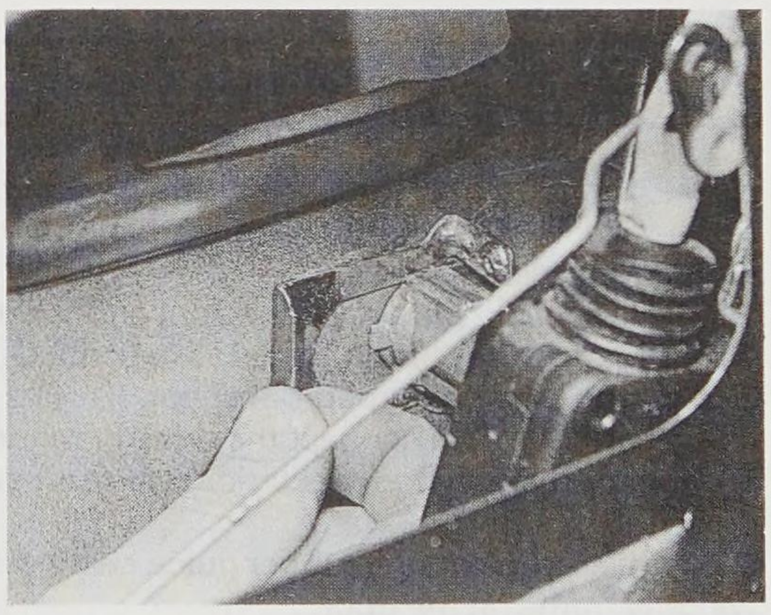
10 Disconnect the latch from the control rods and, where fitted the lock solenoid, and withdraw the latch.



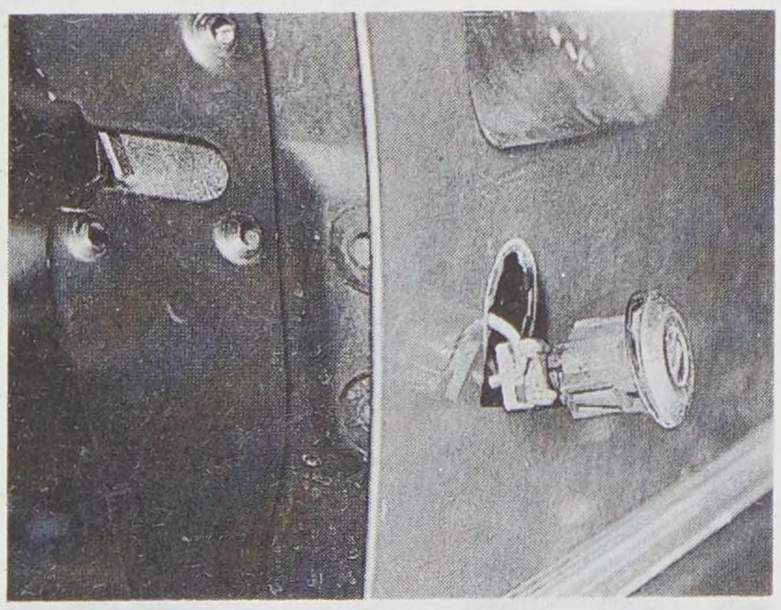
26.4 Unhook the handle from the control rod



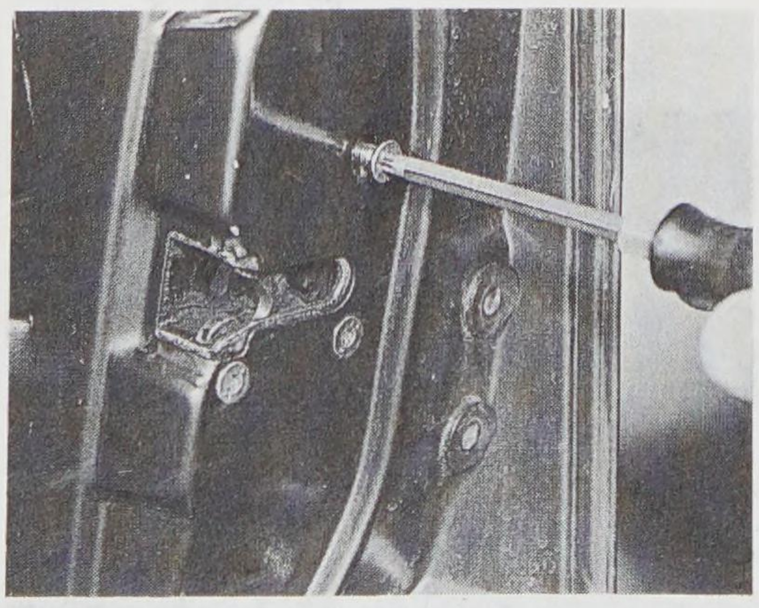
26.5 A handle-to-door securing nut (arrowed)



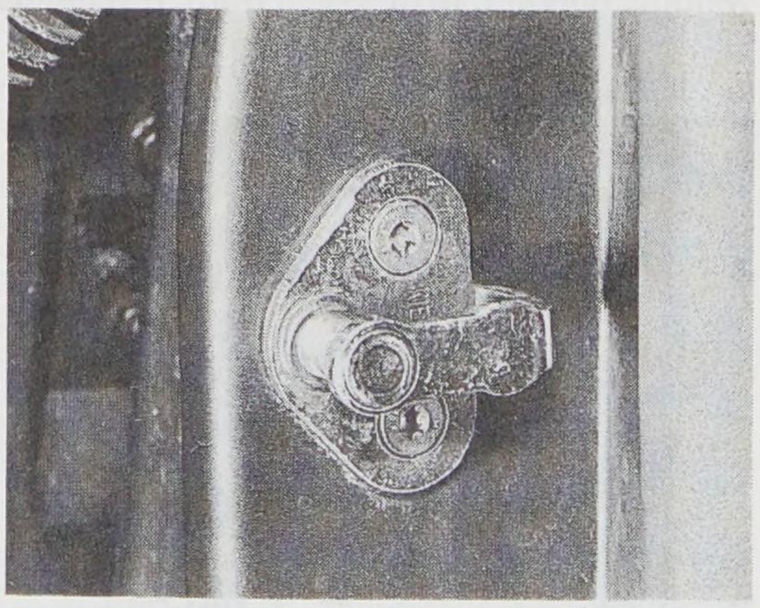
26.7 Removing a lock securing spring clip



26.8 Removing the door lock



26.9 Door latch securing screws



26.11 Door striker plate

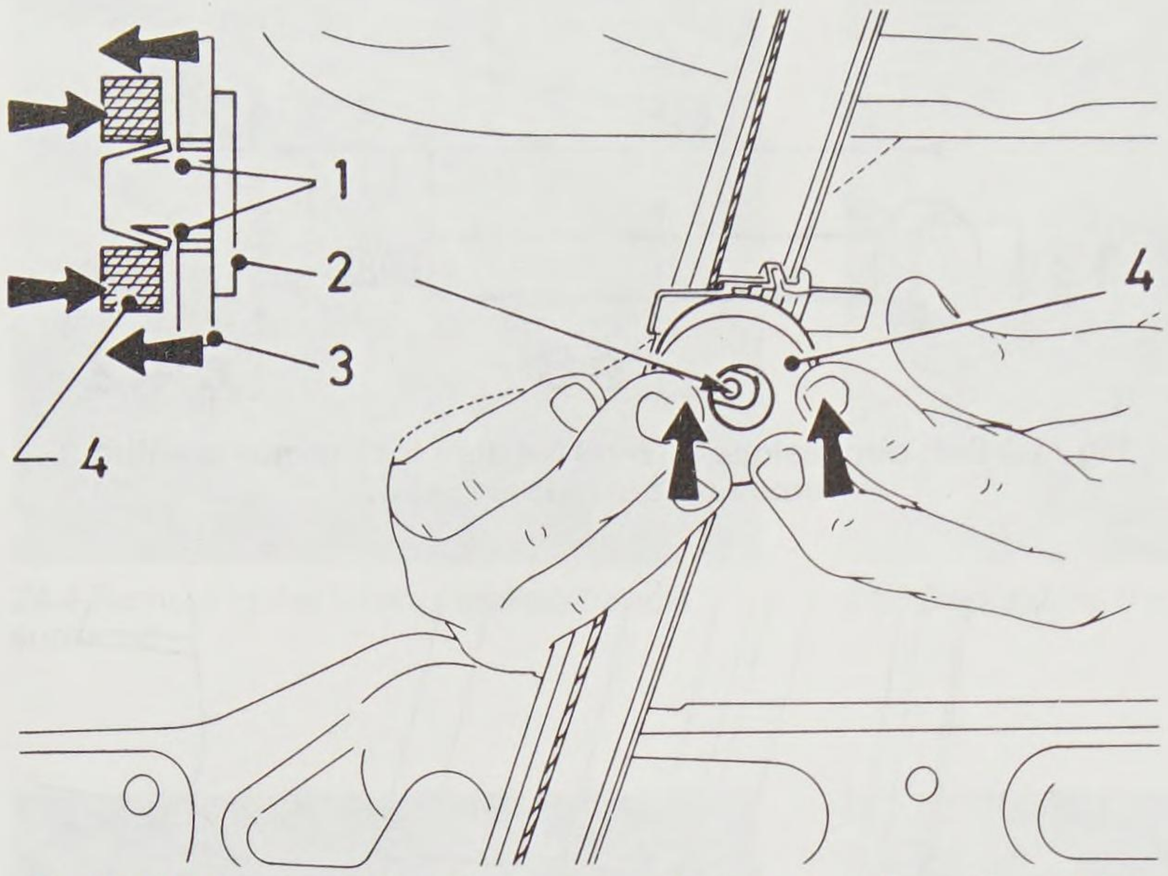


Fig 11.5 Using special tool to release the window from the guide channel (Sec 27)

1 Plastic clips arms
2 Plastic clip and guide channel
3 Door glass
4 Special tool

Door striker

11 Remove the screws from the striker plate and withdraw the striker (photo).

All locks and fittings

12 Refitting is a reversal of removal. When refitting the striker, adjust it to achieve smooth closure of the door without slamming.

27 Door window – removal and refitting

Note: *A special tool (number 7.1309) is required to release the window from the lift channel. We tried several alternatives in the workshop without success (see text).*

1 The procedure is similar for front and rear doors.
2 Remove the door trim panel as described in Section 24.
3 Remove the moistureproof sheet.
4 Where fitted, disconnect the electric window lift motor connector.
5 Remove the window exterior seal from along the top edge of the door.
6 Partially remove the rubber guide channel from the rear edge of the window frame on the door.
7 On rear doors, remove the rear guide channel from the door.
8 The special tool mentioned above is now required. Place the tool over the arms of the plastic clip securing the window to the guide channel so that the arms are depressed, and at the same time push the window outward to release it from the channel.
9 Once the window is released from the guide channel, manoeuvre it out of the door, upward and to the outside.
10 Refitting is a reversal of removal.

28 Window lift regulator assembly – removal and refitting

1 Remove the window as described in Section 27.
2 Disconnect the plug on the window lift mechanism where electric windows are fitted.
3 Remove the nuts securing the lift motor (electric) or regulator (manual), to the door skin (photos).
4 Remove the nuts securing the lift cable and channelling to the door.
5 Manoeuvre the assembly from the door out of the large lower aperture (photo).
6 Both manual and electric lift assemblies are only renewable as a complete assembly.
7 Refitting is a reversal of removal.

29 Windscreen and rear window – general

1 The windscreen and rear window (on both Saloon and Estate models) are bonded to the bodywork using special tools and adhesive mastic. Their removal also requires the use of special tools.
2 For this reason, if either screen requires removal or refitting the services of a specialist windscreen fitting firm, or your local Peugeot dealer should be employed. Let them take the risk of breakage.

30 Rear quarterlight – removal and refitting

Note: *This procedure covers a Saloon model. That for the Estate is similar.*

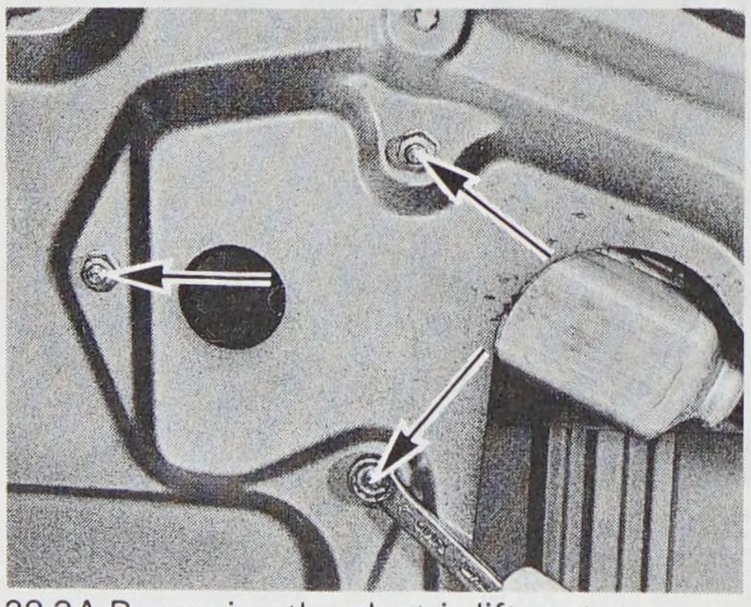
1 Remove the door interior trim panel as described in Section 24.
2 Remove the bolts from the window guide channel.
3 Pull off the finishing strip from the quarterlight seal, where fitted.
4 Pull up the window interior seal.
5 Pull down the window upper guide channel (Fig. 11.7).
6 Lower the guide channel.
7 Pull the quarterlight forward out of its aperture.
8 Refit in reverse.

31 Rear side windows (Estate) – general

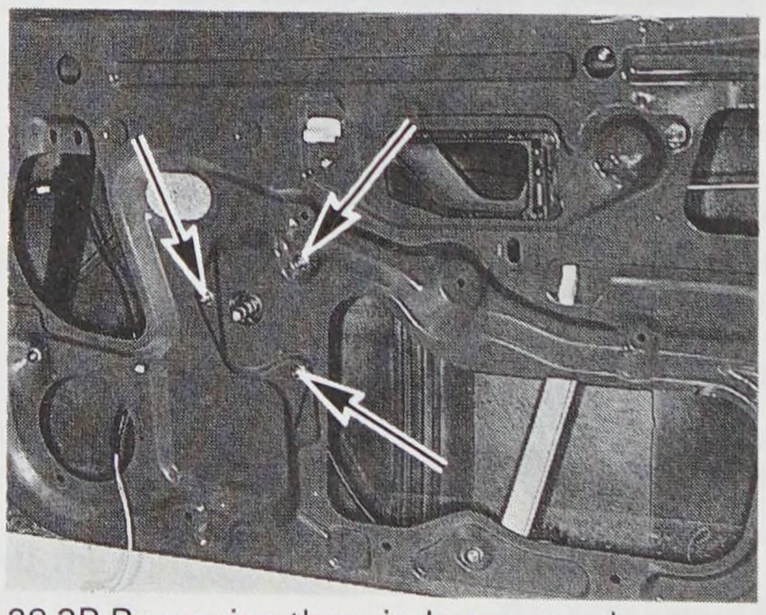
Refer to Section 29, the same comments apply.

32 Rear view mirrors (exterior) – removal and refitting

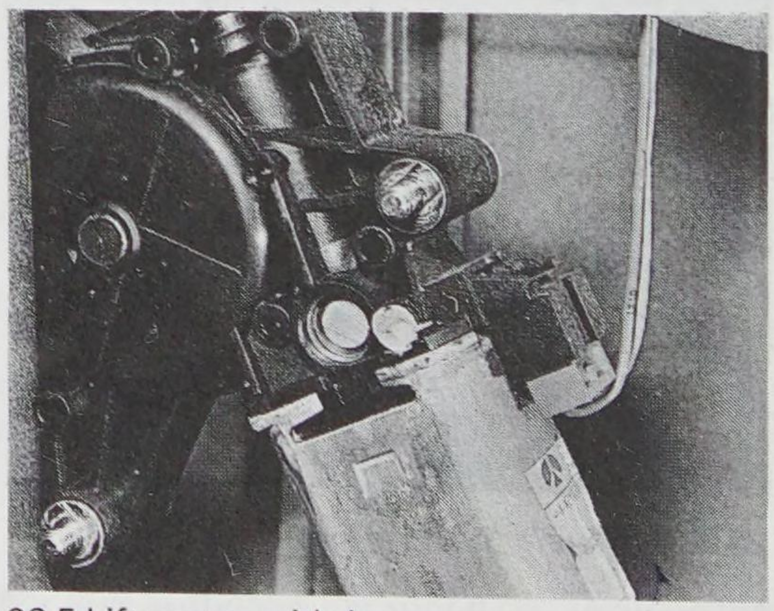
1 A variety of rear view mirrors may be encountered according to model specification and year of manufacture. The following is a guide to all types.



28.3A Removing the electric lift motor securing nuts (arrowed)



28.3B Removing the window manual regulator nuts (arrowed)



28.5 Lift motor withdrawn

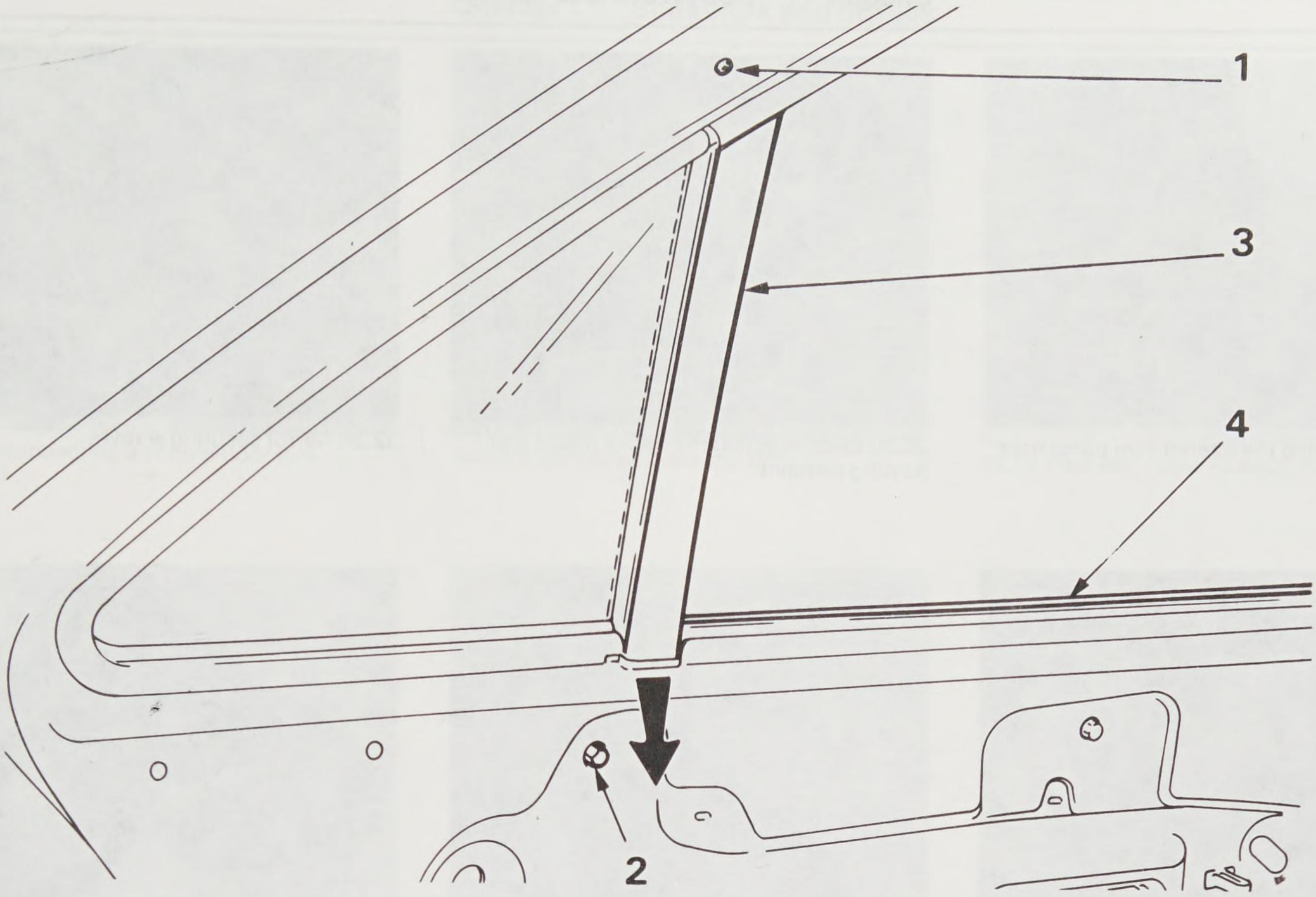


Fig 11.6 Removing a rear quarterlight (Sec 30)

1 Guide channel upper bolt *2 Guide channel lower bolt* *3 Guide channel* *4 Window interior seal*

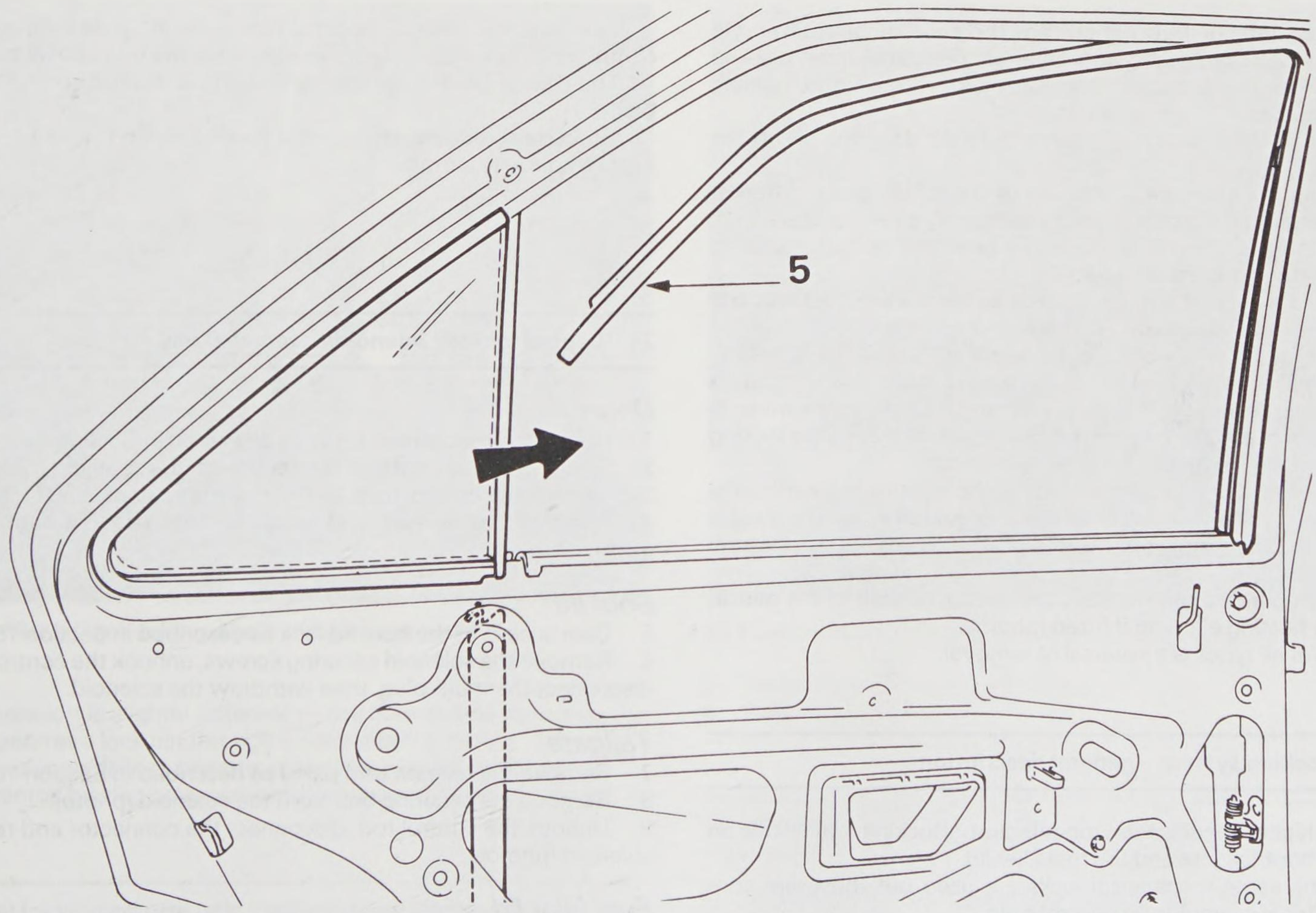
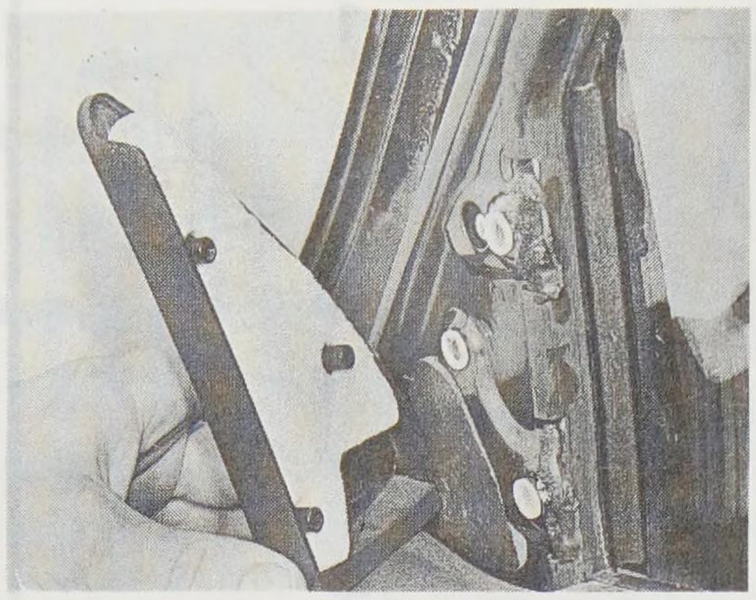
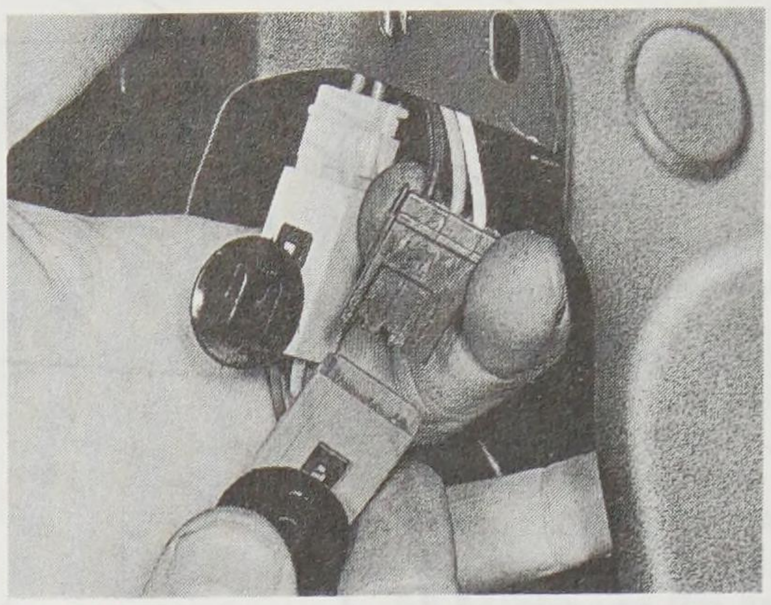


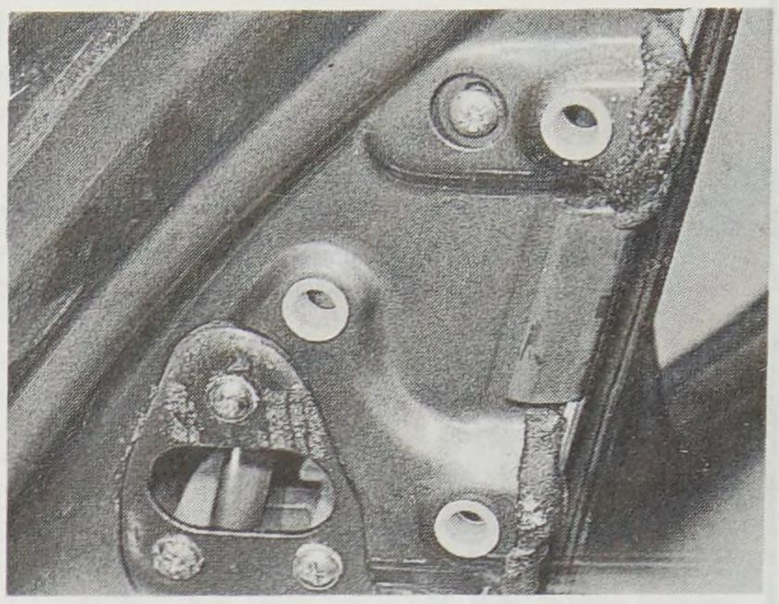
Fig 11.7 Window upper guide channel (5) pulled down to release quarterlight (Sec 30)



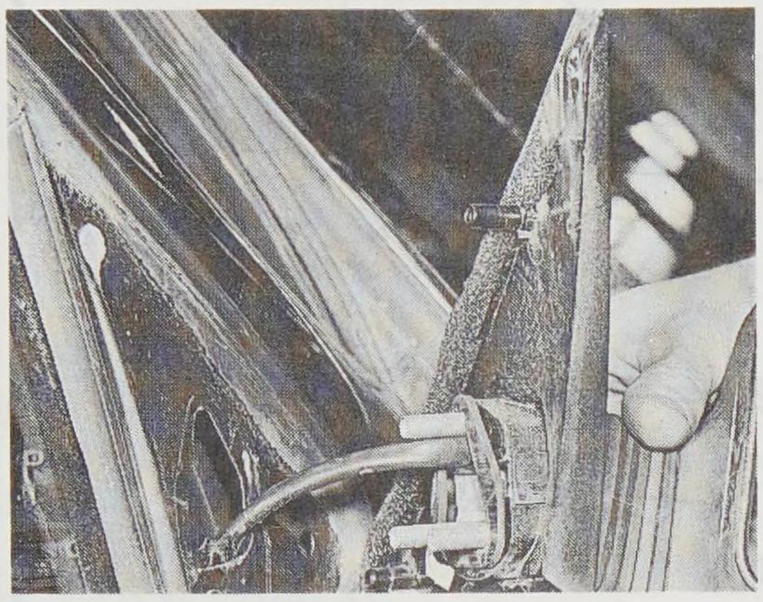
32.2A Removing the interior trim panel from mirror base



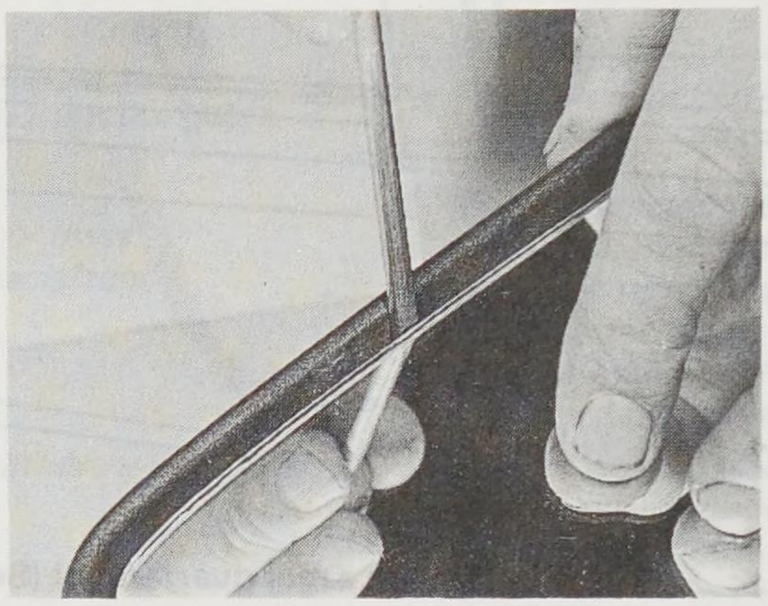
32.2B Disconnecting the mirror motor and heating element



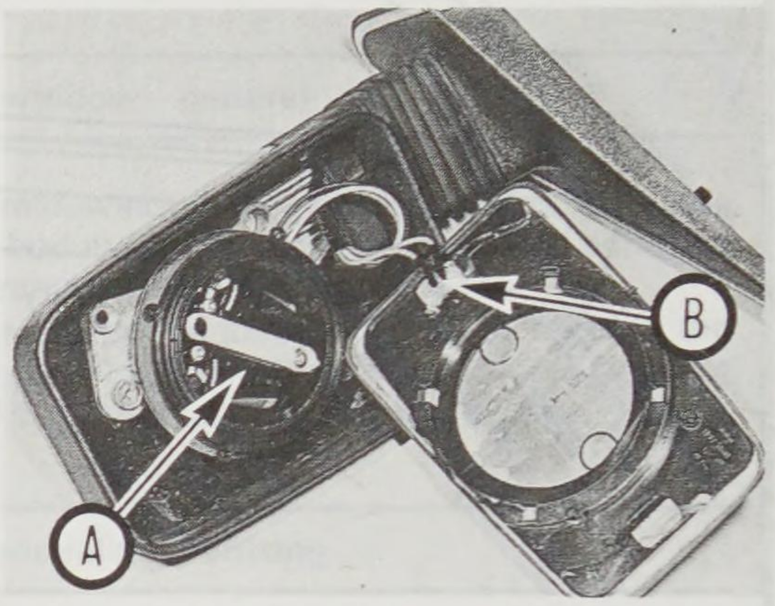
32.3A Mirror securing screws



32.3B Lifting off the mirror



32.7 Releasing the locking ring on the mirror



32.9 View inside an electric mirror showing the motor (A) and heating element connections (B)

2 Remove the interior trim panel from the base of the mirror. On electrically operated tyres, the door interior trim panel must also be removed, in order to disconnect the motor and, where fitted, heating element connectors in the door (photos).
3 Remove the screws securing the mirror to the door and lift off the mirror (photos).
4 If the reason for removal is renewal of the mirror glass, different methods of securing the mirror in the housing may be encountered.
5 On some models, the mirror cannot be removed from the housing and the complete unit must be renewed.
6 On others, the back of the housing has a removable panel which is clipped in place and can be removed for mirror access.
7 On some types, usually electrically operated, the mirror is held in position by a locking ring which can be levered to the unlocked position by tilting the mirror to its full extent, inserting a small screwdriver in between the mirror and the edge of the housing and rotating the locking ring, after which the mirror can be removed (photo).
8 A further method of retaining a mirror in the housing is by adhesive pads. It is unlikely that these will need removal except when the glass is broken, in which case simply remove the broken pieces and stick a new mirror in position.
9 Electrically operated mirrors have the motor housed in the mirror, along with the heating element if fitted (photo).
10 Refitting of all types is a reversal of removal.

33 Central locking system – general description

On certain higher specification models central locking is available on all four doors, boot/tailgate and the fuel filler lid.

Basically the same mechanical locks are used but these are connected to electrical solenoids by control rods.

All the solenoids are energised by turning the key in the driver's door lock, or by operating the lock button in the driver's or front passenger door.

The locks can also be operated by the hand-held infra-red remote control unit. The master unit is contained in the roof console.

The central locking system control unit is located behind the glovebox.

On certain models, the central locking system also activates the interior courtesy lamps.

34 Central locking solenoids – removal and refitting

Doors

1 Unbolt the mechanical locks as described in Section 26.
2 Disconnect the electrical connection on the solenoid (photo).
3 Unhook the control rods and lift out the solenoid and lock (photos).
4 Remove the screws and separate the solenoid from the lock mechanism.

Boot lid

5 Gain access to the boot lid lock as described in Section 15.
6 Remove the solenoid securing screws, unhook the control rods and disconnect the multi-plug, then withdraw the solenoid.

Tailgate

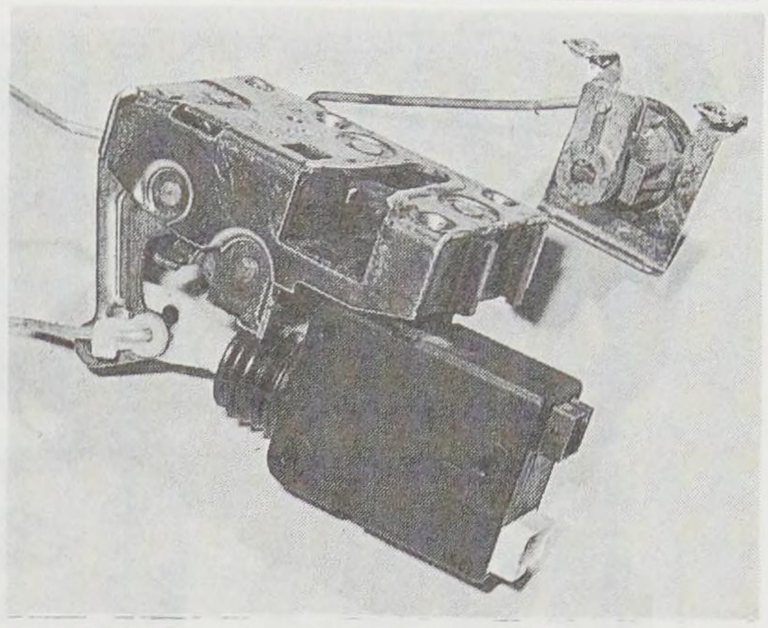
7 Remove the tailgate trim panel as described in Section 18.
8 Remove the securing bolt from the solenoid (photo).
9 Unhook the control rod, disconnect the connector and remove the solenoid (photos).

Fuel filler lid

10 The solenoid is located behind the rear screen washer bottle on Estate models and behind the right-hand trim panels in the boot on Saloon models.

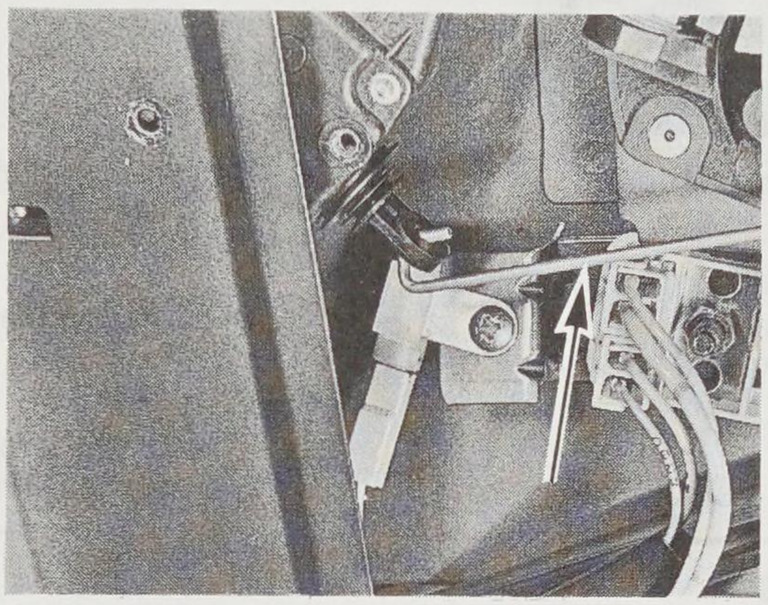
34.2 Disconnecting a central door lock solenoid

34.3A Lock solenoid control rods

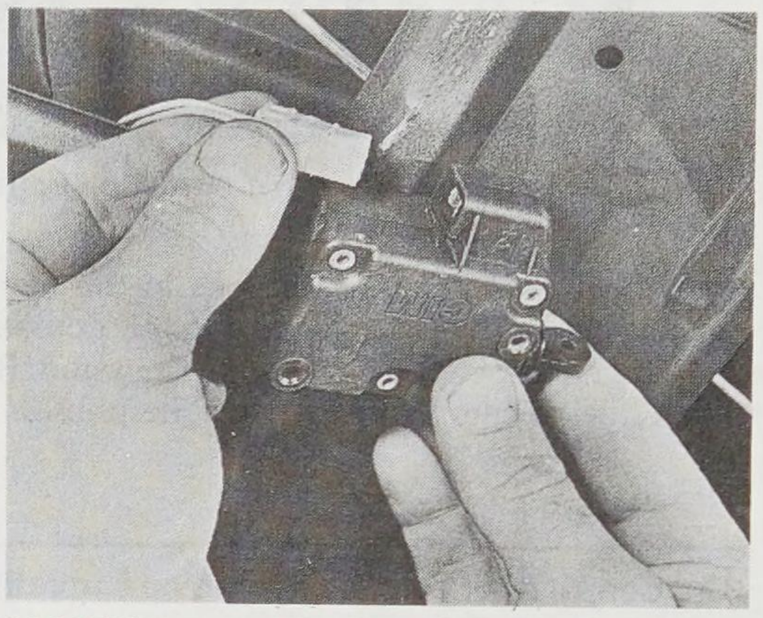


34.3B Lock and solenoid assembly

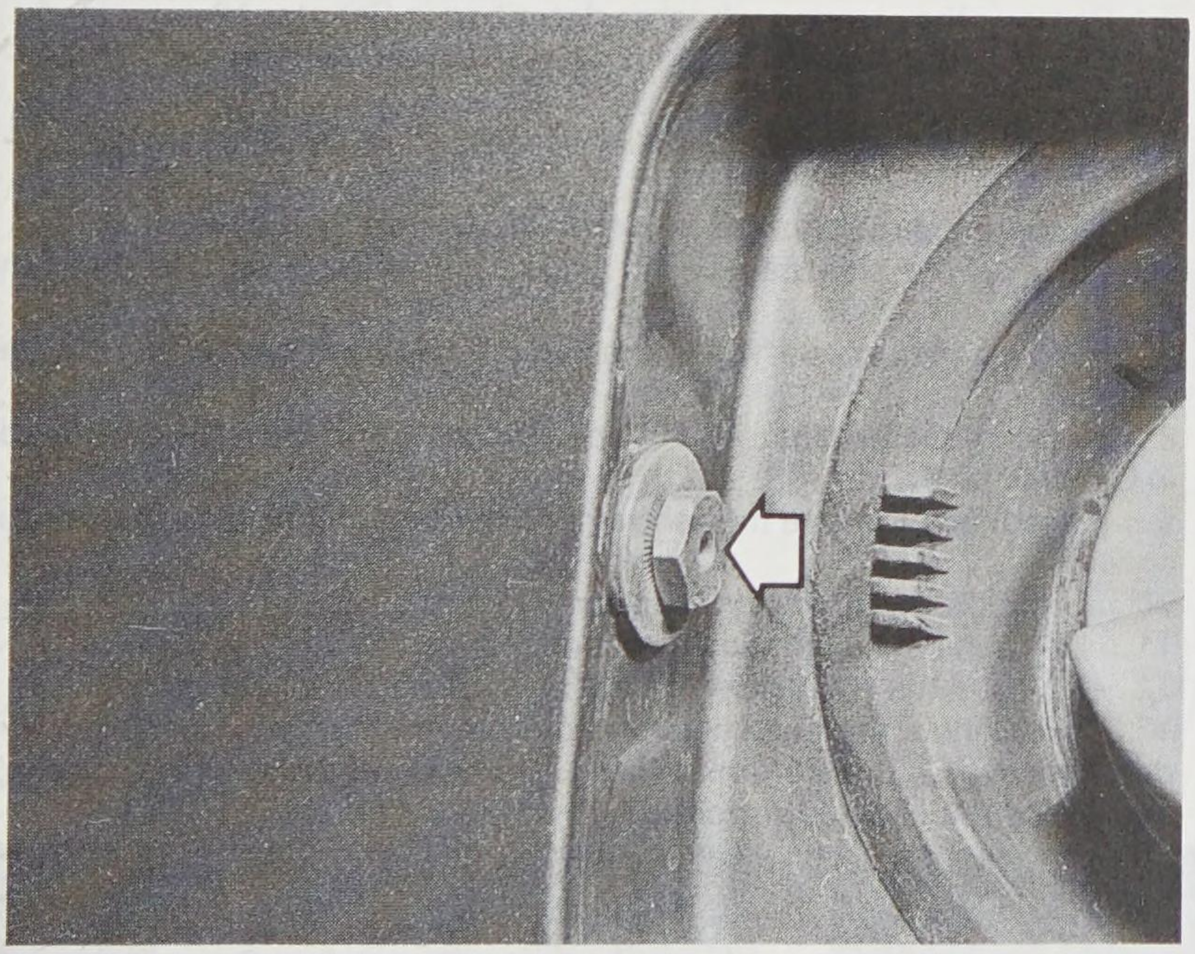
34.8 Removing the bolt from the tailgate lock solenoid



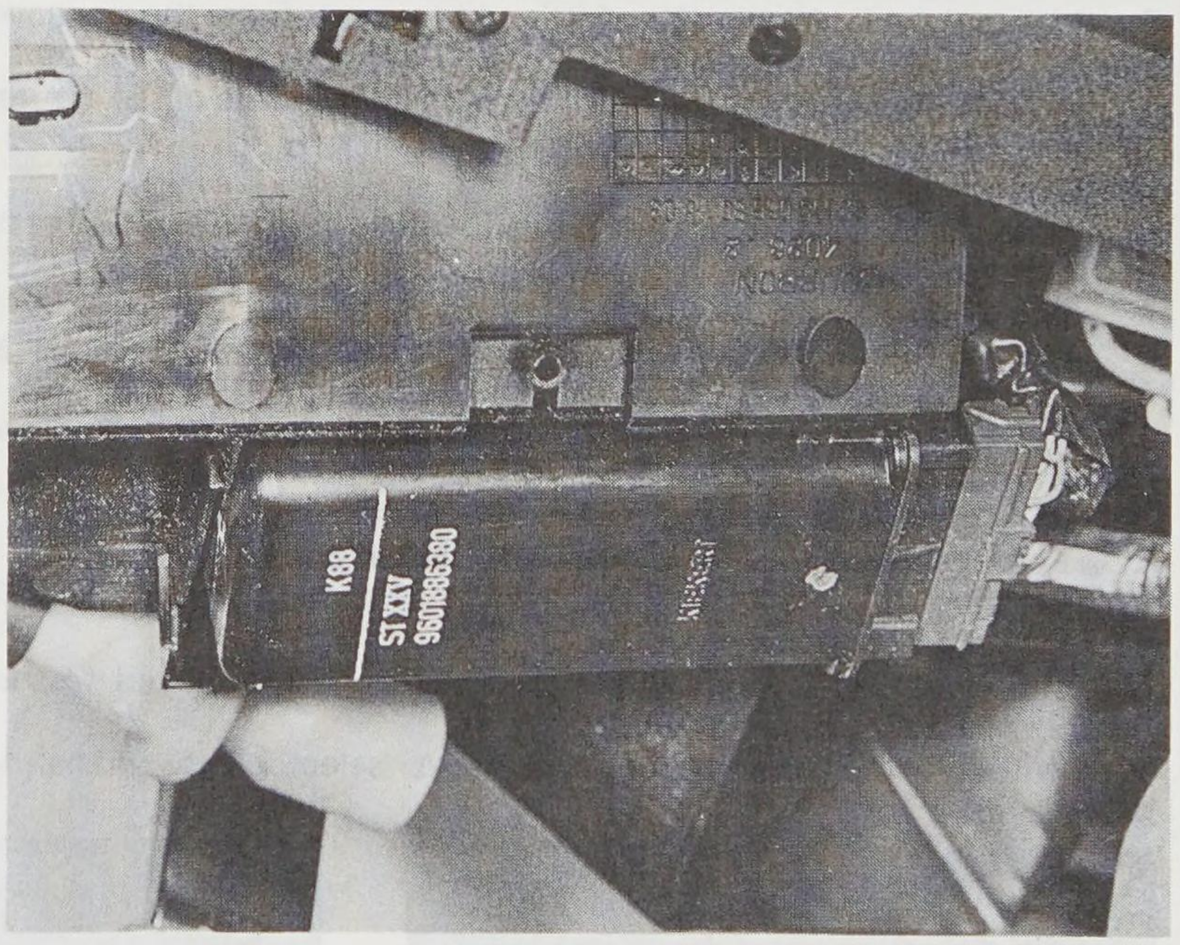
34.9A Tailgate lock solenoid control rod (arrowed)



34.9B Disconnecting the tailgate lock solenoid



34.11 Fuel filler lid lock solenoid bolt and pin (arrowed)



35.3 Central locking control unit behind the glovebox

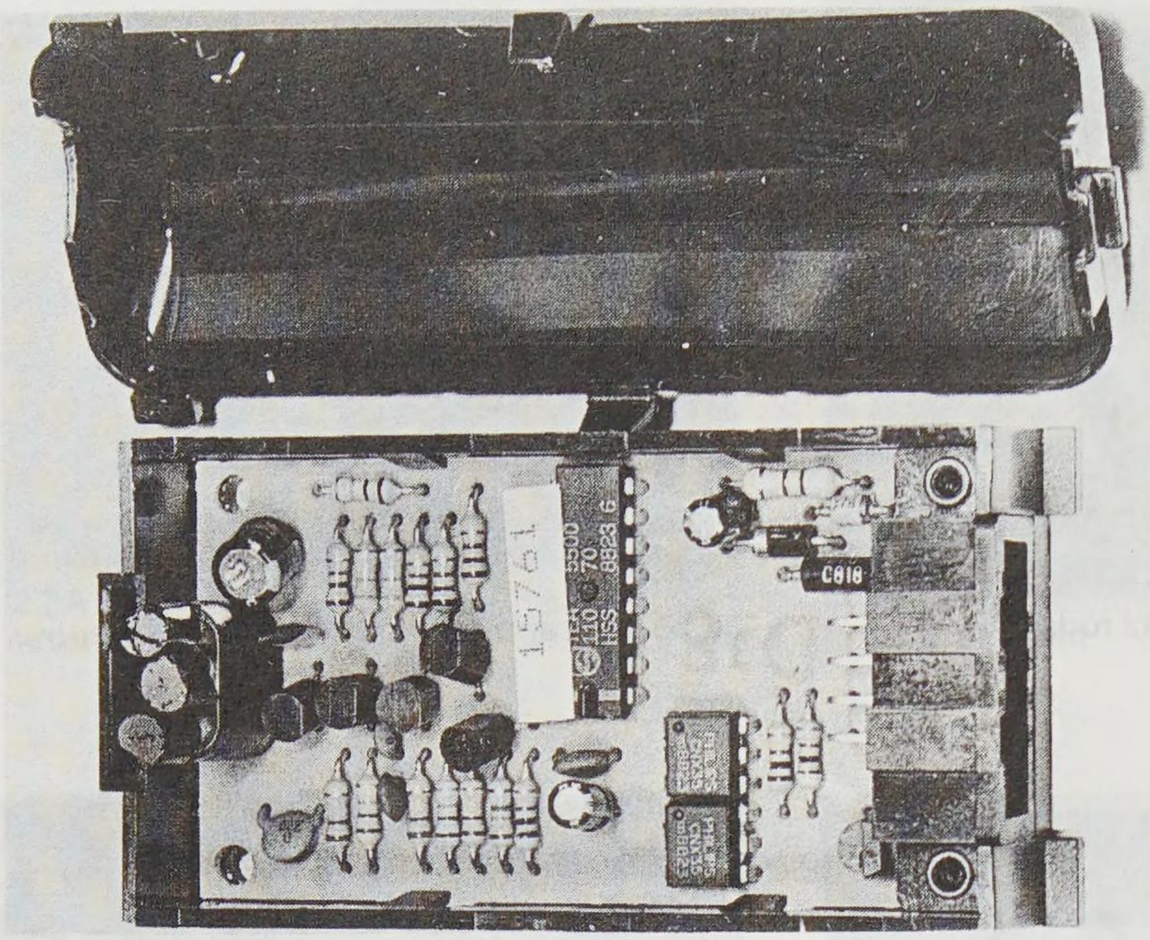
11 Its operation is slightly different to the door solenoids in that the solenoid operates a lock pin through a central bolt (photo).
12 If the solenoid fails to operate, it can be operated manually.
13 The central locking solenoid is mounted on the fusebox.

35 Central locking control unit – removal and refitting

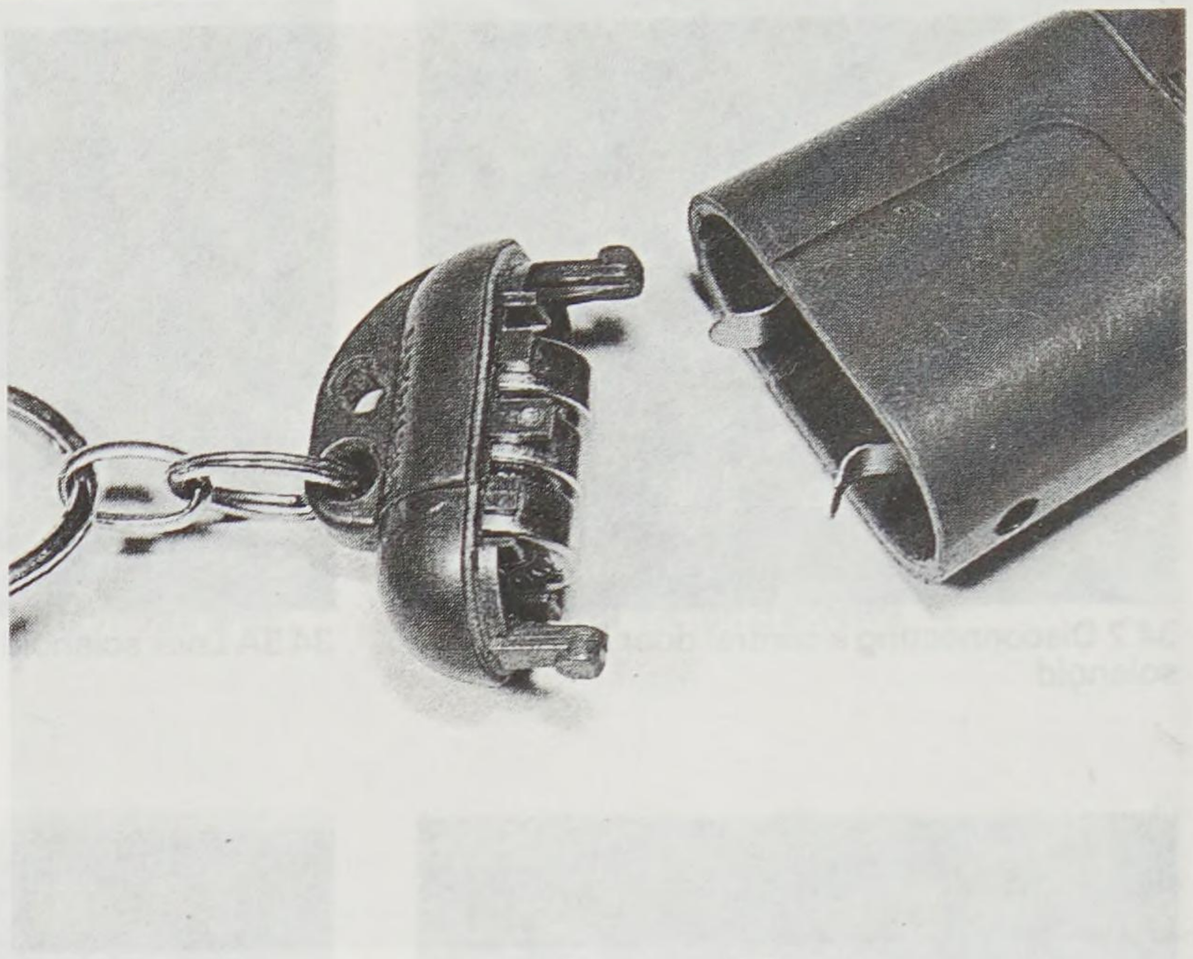
1 Remove the glovebox unit as described in Section 40.
2 Disconnect the electrical multi-plug.
3 Remove the control unit (photo).
4 Refit in reverse order.

36 Central locking infra-red control – general

1 The infra-red door control unit is mounted in the roof console.
2 It is a 'black box' unit containing printed circuits, resistors, diodes, etc (photo).
3 If defective, it may possibly be repaired by an auto electrician, but if repair is not possible the complete unit must be renewed.



36.2 Central locking infra-red control unit with cover removed



36.5 Battery compartment on infra-red control unit

4 Ensure it is not the batteries in the hand-held control which are causing the problem before taking this course of action.
5 The hand-held unit is battery operated. Renew the batteries in the unit if the indicator lamp fails to light (photo).

37 Centre floor console – removal and refitting

Full-length type

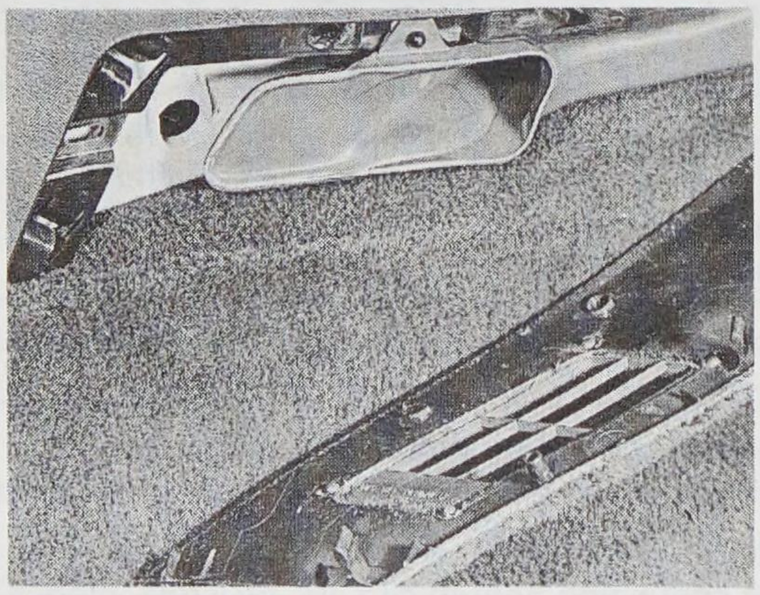
1 Disconnect the battery negative terminal.
2 Slide the front seats fully rearward.
3 Prise out and remove the plastic side panels from the console (photo).
4 Remove the upper screws tucked in behind each side of the centre console.
5 Remove the air ducts (photo).
6 Prise out the cassette holder box and remove the two screws from the aperture.
7 Slide the front seats fully forward.
8 Prise out the blanks from each side of the rear end of the console and remove the screws under them.
9 Lift the lid of the rear stowage compartment and remove the screw from the compartment floor.
10 Prise out and disconnect the switches in the console.
11 Remove the handbrake lever dust excluder (photo).
12 Remove the gear lever/selector lever surround (photo) and pull back the gear lever gaiter.
13 Lift the console slightly, unclip any cable ties attached to the console and disconnect the multi-plugs.
14 Withdraw the console over the gear lever/selector lever and hand-brake lever.
15 Refit in reverse order.

Short type

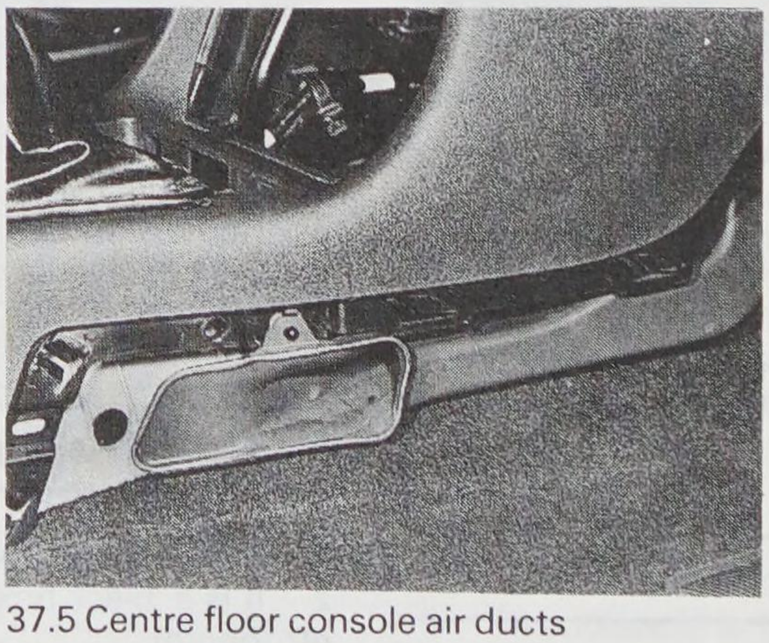
16 The procedure is similar to that just described for both the front and rear sections, with reference to Figs. 11.9 and 11.10.

38 Facia panel – removal and refitting

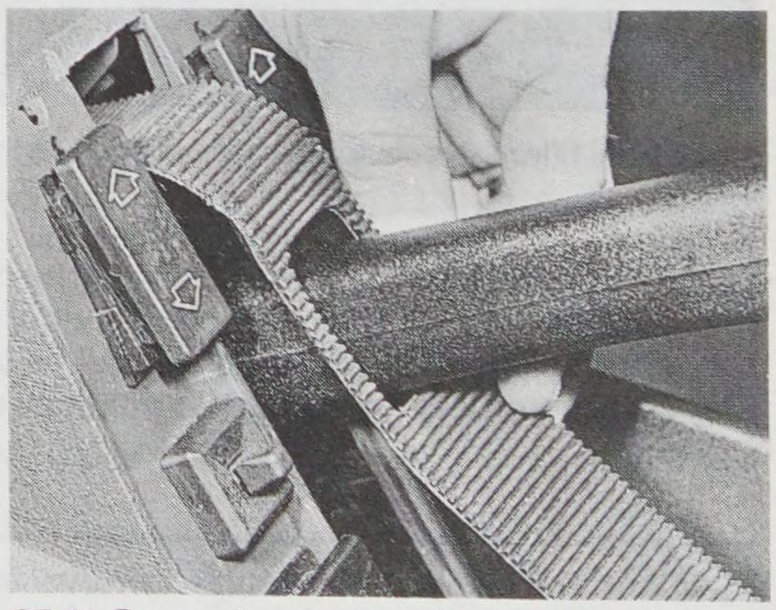
1 Disconnect the battery negative terminal.
2 Remove the steering wheel as described in Chapter 10.
3 Remove the steering column shroud panels as described in Section 39.
4 Remove the instrument panel as described in Chapter 12, Section 18.
5 Remove the radio as described in Chapter 12, Section 49.
6 Remove the side panels from the floor console as described in Section 37.
7 Remove the screws from either side of the lower part of the centre console.
8 Remove the headlamp beam adjuster cable end fitting as described in Chapter 12, Section 39.
9 Pull out and remove the ashtray and the trinket box from the centre console.
10 Undo the two bolts in the ashtray recess (photo).
11 Undo the bolt in the radio recess (photo).
12 Remove the two screws from the 'roof' of the trinket box recess.
13 Disconnect the switches (photo), remove the screws, then withdraw the switch panel from the right-hand side of the steering column, and the centre console surround.



37.3 Centre floor console side panel withdrawn



37.5 Centre floor console air ducts



37.11 Removing the handbrake lever dust excluder

Fig 11.8 Full-length centre floor console – left-hand drive shown (Sec 37)

Fig 11.9 Short type centre floor console (Sec 37)

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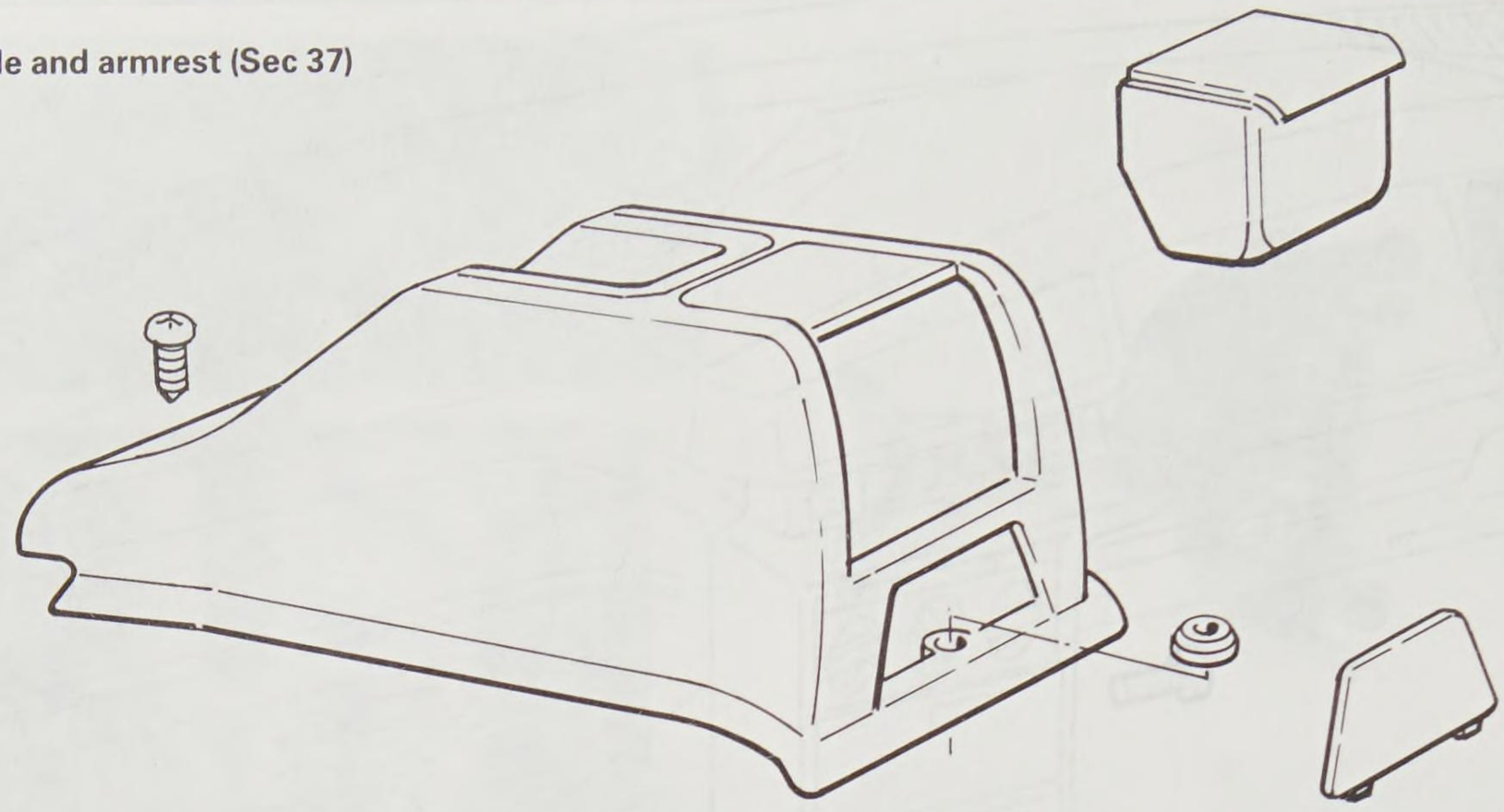
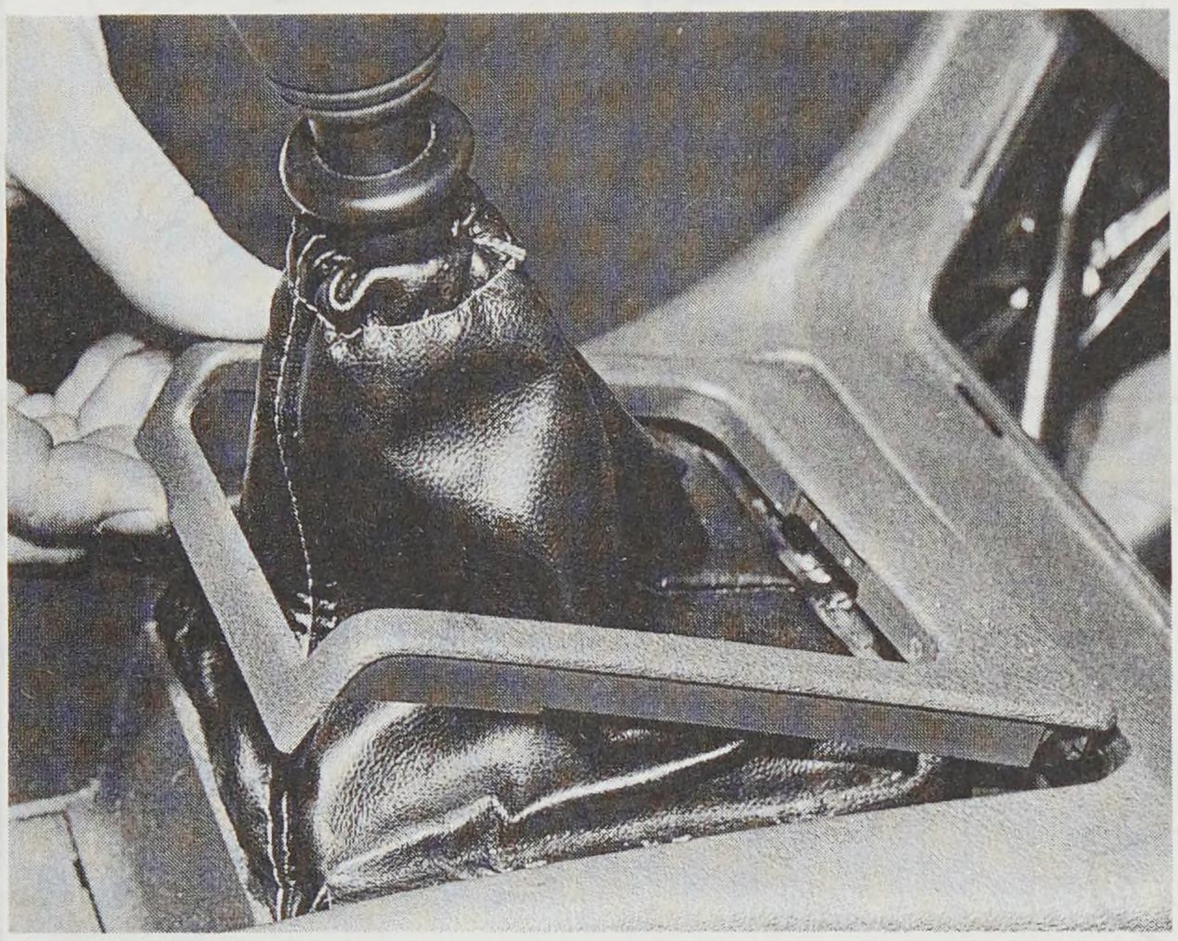
Fig 11.10 Rear console and armrest (Sec 37)





37.12 Removing the gear lever surround

14 Remove the windscreen wash/wipe switch from the steering column.
15 Remove the screws securing the heater control panel as described in Section 53.
16 Drop the fusebox panel forward as described in Chapter 12, Section 11.
17 Remove the bolts from the bonnet release handle.
18 Disconnect the rheostat.
19 Disconnect the two connectors on the fusebox shown in the photograph (photo).
Note: *Because we found the wiring looms to be impossibly intertwined, we disconnected all the fusebox terminals marking them 1-1, 2-2 etc for refitting, then removed the complete fusebox by undoing the hinge rail (photo).*
20 Disconnect the facia harness connections under the left and right-hand side of the facia, again marking them 1-1, 2-2 etc for re-connection. Also undo the earth lead on the left-hand door frame (photo). Remove the plastic kickplate to gain access to the earth lead.
21 Remove the nut and release the relay bracket on the lower steering column (photo).
22 Remove the three nuts located in the scuttle securing the facia panel the bulkhead (photo).
23 Remove the bolts securing the lower facia brackets to each side panel in the footwells (photo).
24 Remove the screws either side of the centre console.
25 Remove the bolt located behind the heater control panel (photo).
26 Unbolt and remove the; support rod between the gear lever bracket and the centre console.
27 Disconnect the remaining column switch connectors.
28 Disconnect the brake lamp switch.
29 Disconnect the cigar lighter and ashtray illumination lamp.
30 Carefully ease the panel forward, feeding the speedometer cable, heater control panel and wiring looms through as it comes forward.
31 Once clear, remove the panel from the vehicle.
32 Refitting is a reversal of removal, ensuring that the locating spigots are properly located in the bulkhead (photo).

39 Steering column shroud panels – removal and refitting

1 Undo the screws on the underside of the lower shroud panel (photo).
2 Unclip the upper shroud panel from the lower and remove the two panels.
3 Refit in reverse order, lower shroud panel first.

40 Glovebox – removal and refitting

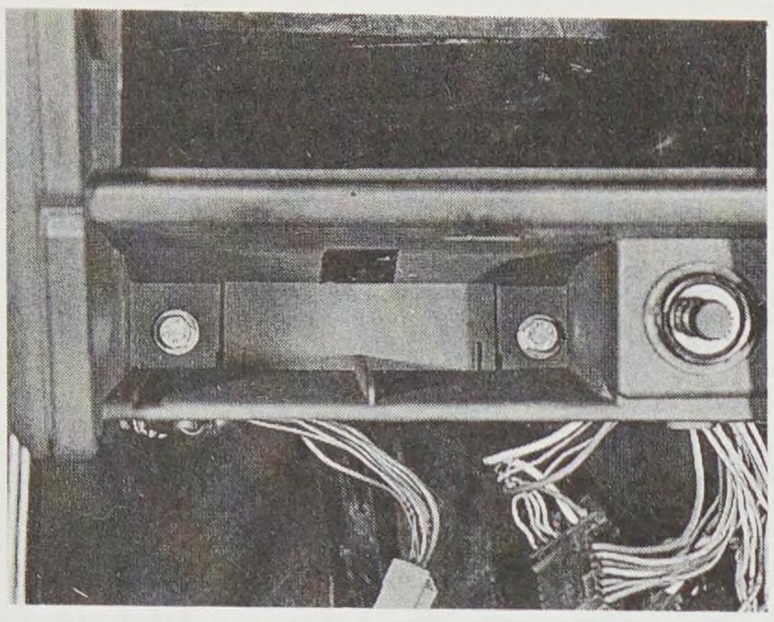
1 Remove the glovebox lid hinge pins.
2 Remove the screws securing the cover to the rear of the lid.
3 Lift off the lid, leaving the cover held by the checkstraps.
4 The checkstraps can be removed by releasing their inner ends.
5 Refit in reverse order, noting that the longer checkstrap is fitted on the left.

41 Face level vents – removal and refitting

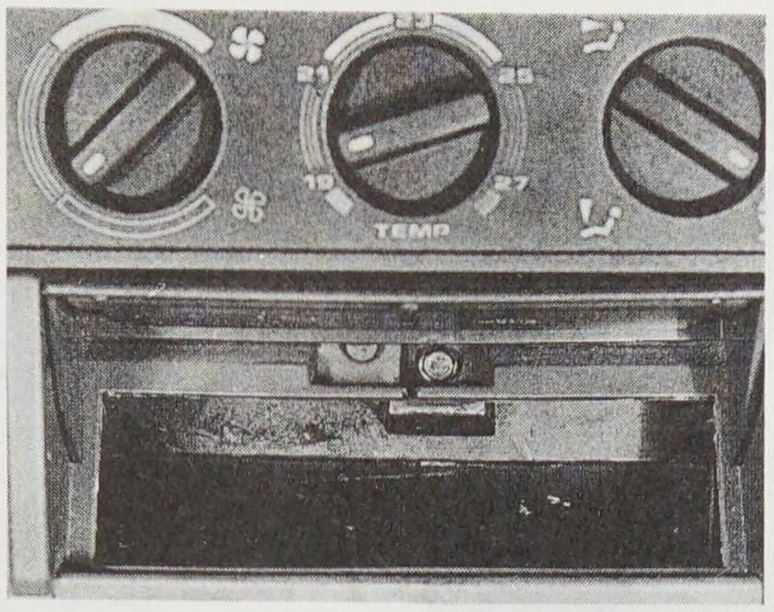
1 Prise out the grille over the tweeter speaker.
2 Remove the vent securing screw and withdraw the vent (photo).
3 Refit in reverse order.

42 Grab handles – removal and refitting

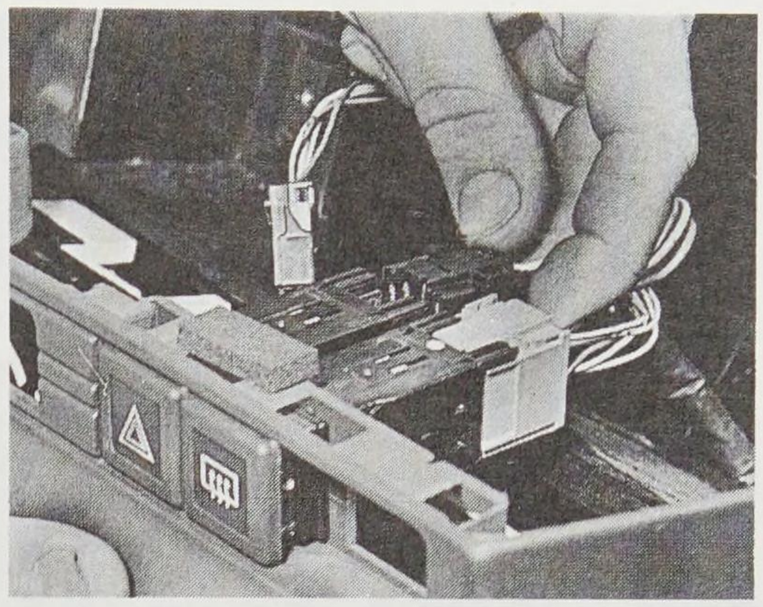
1 Prise out the plastic insert in the handle.
2 Remove the two screws securing the handle to the roof panel and lift off the handle (photo).
3 Refit in reverse order.



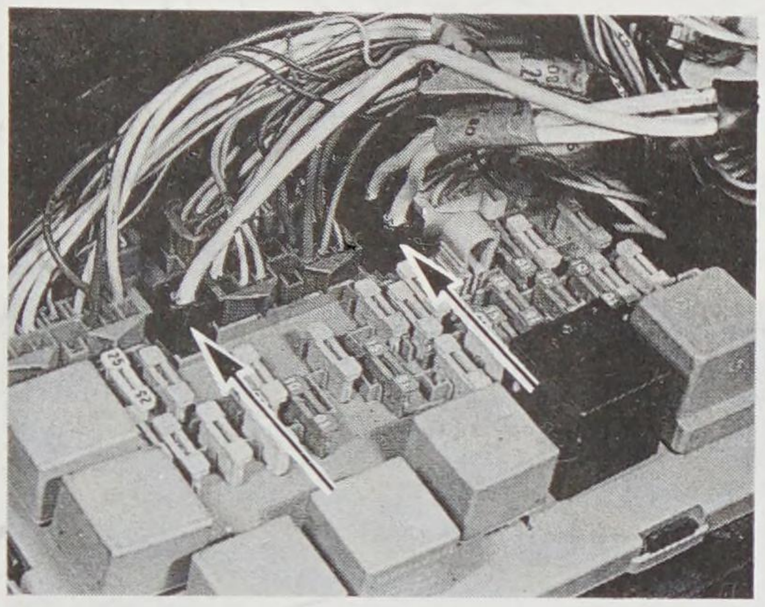
38.10 Undo the two bolts in the ashtray recess



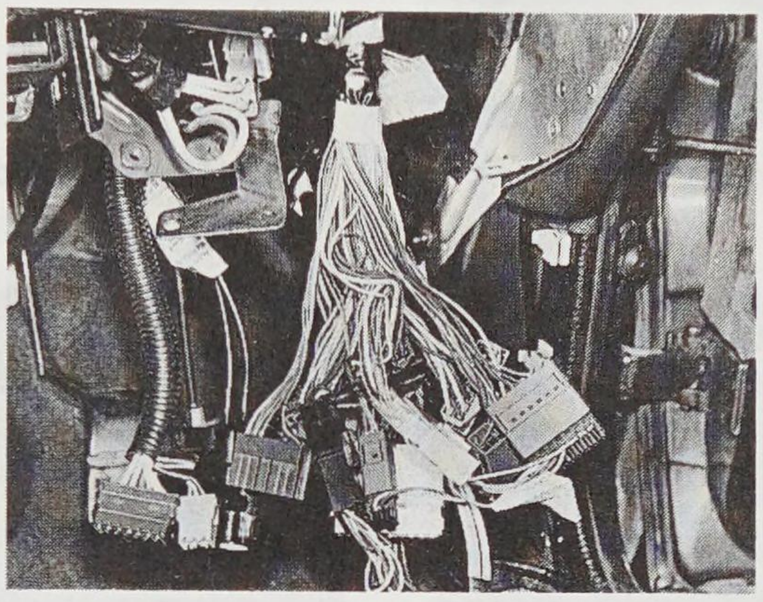
38.11 Undo the bolt in the radio recess



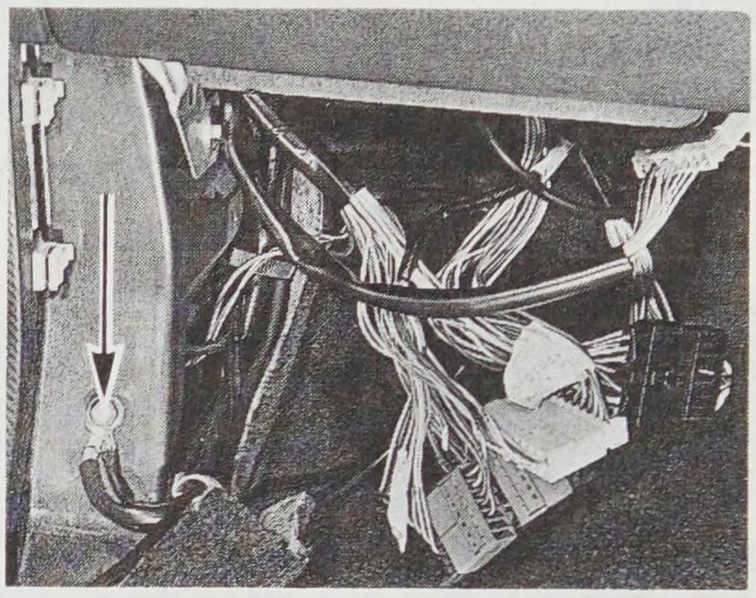
38.13 Disconnecting the switches in switch panel



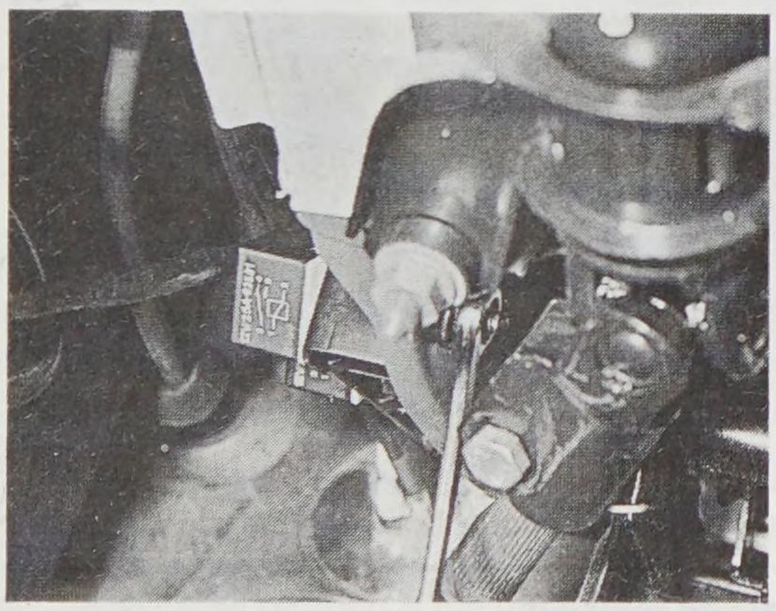
38.19A The two connectors on the fusebox (arrowed)



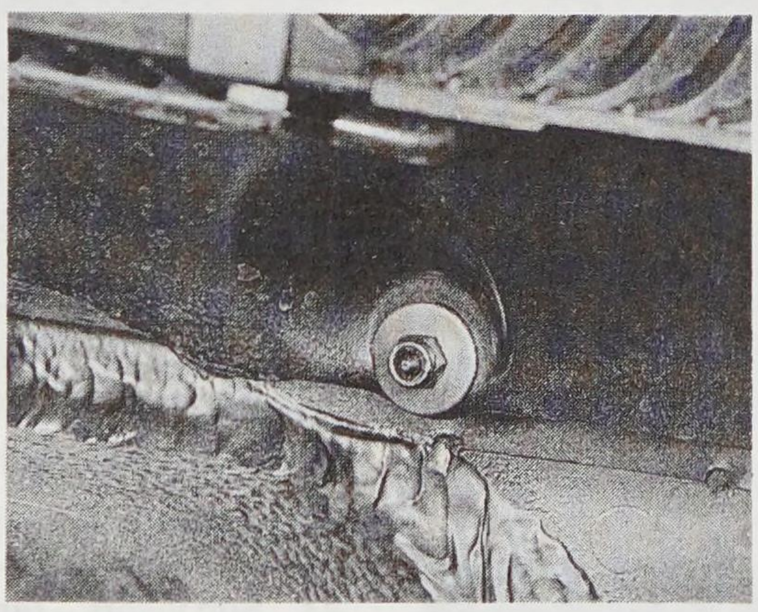
38.19B Fusebox connectors disconnected and fusebox removed



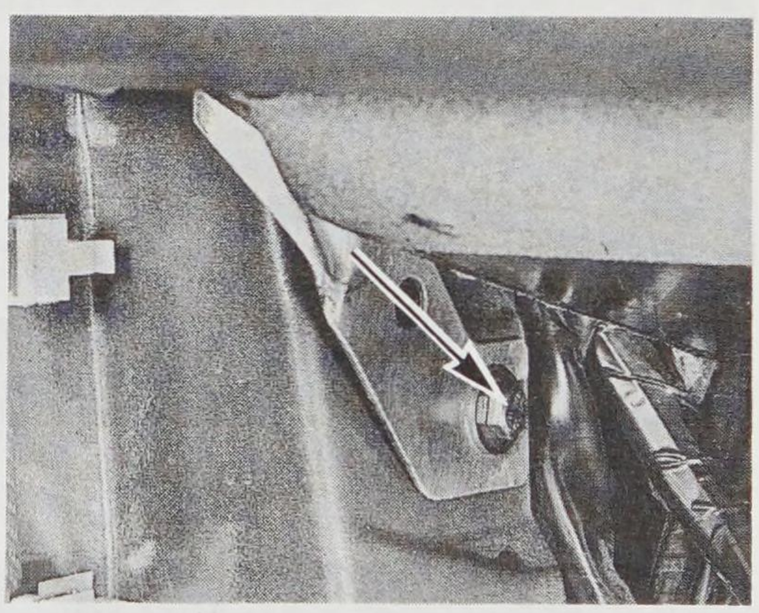
38.20 Earth lead on left-hand door frame (arrowed)



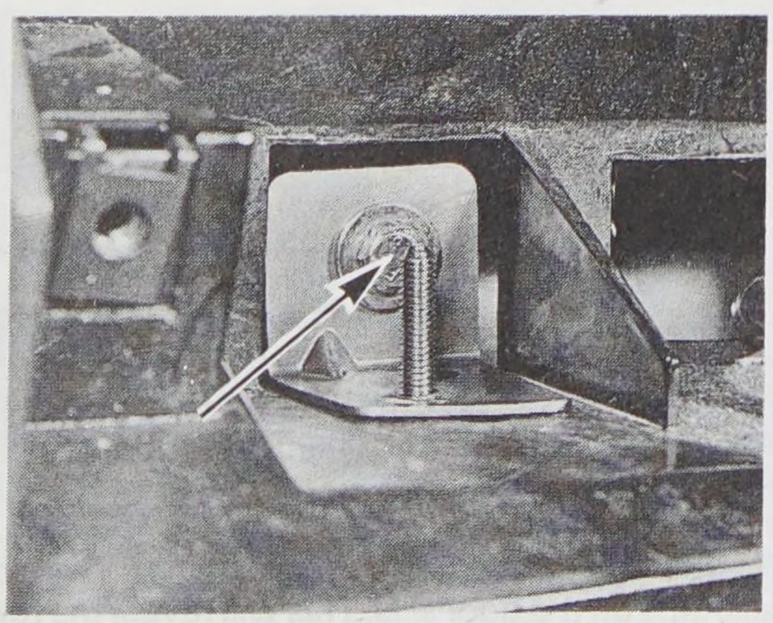
38.21 Releasing the relay bracket on lower steering column



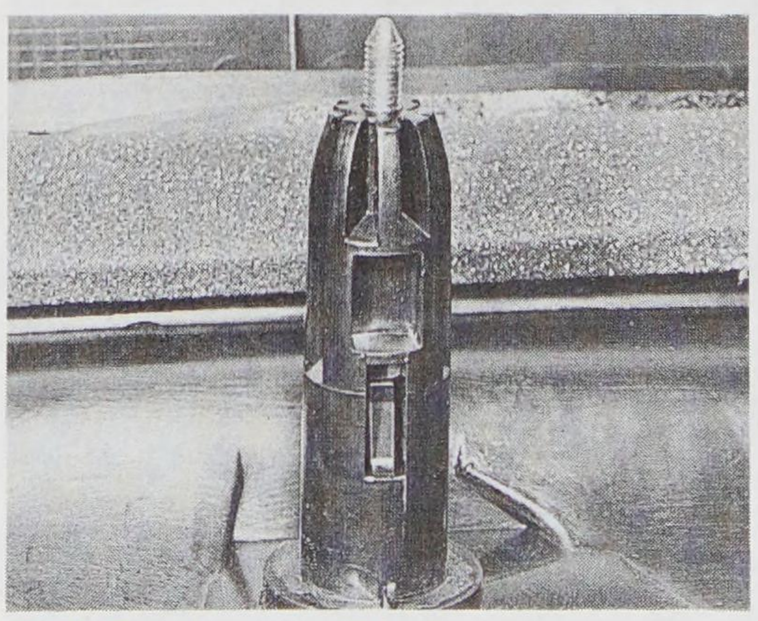
38.22 Facia panel securing nut in scuttle



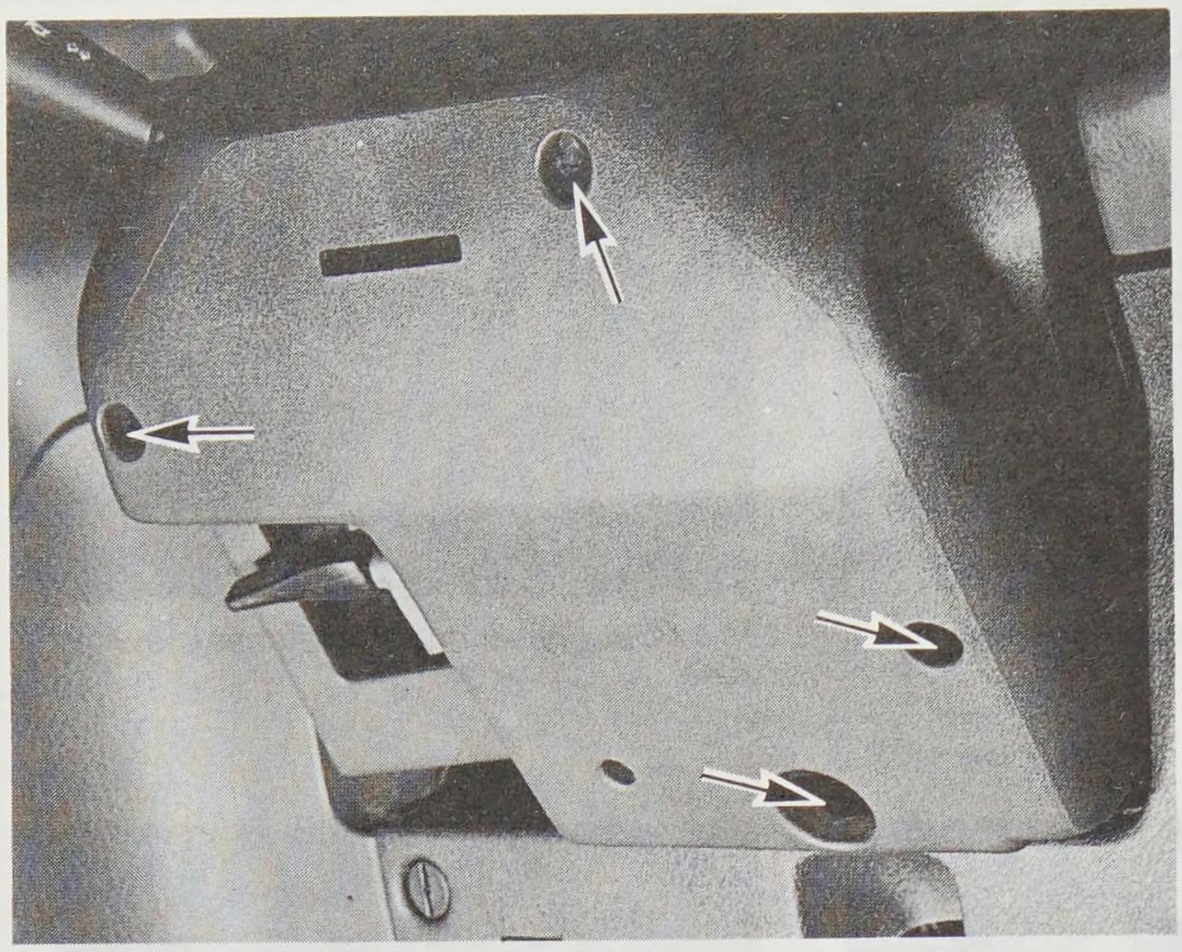
38.23 Lower facia securing bracket bolt (arrowed)



38.25 Bolt located behind the heater control panel (arrowed)



38.32 Facia locating spigot



39.1 Steering column lower shroud panel screws (arrowed)

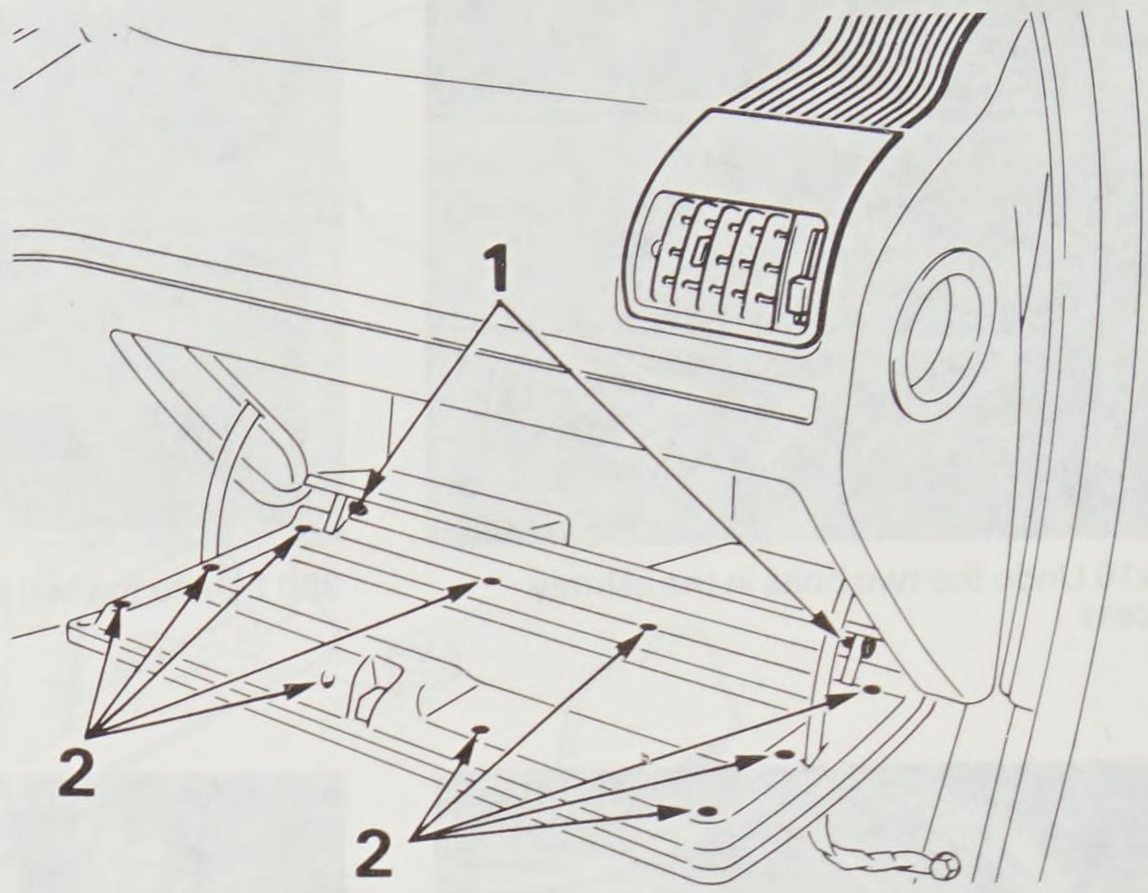
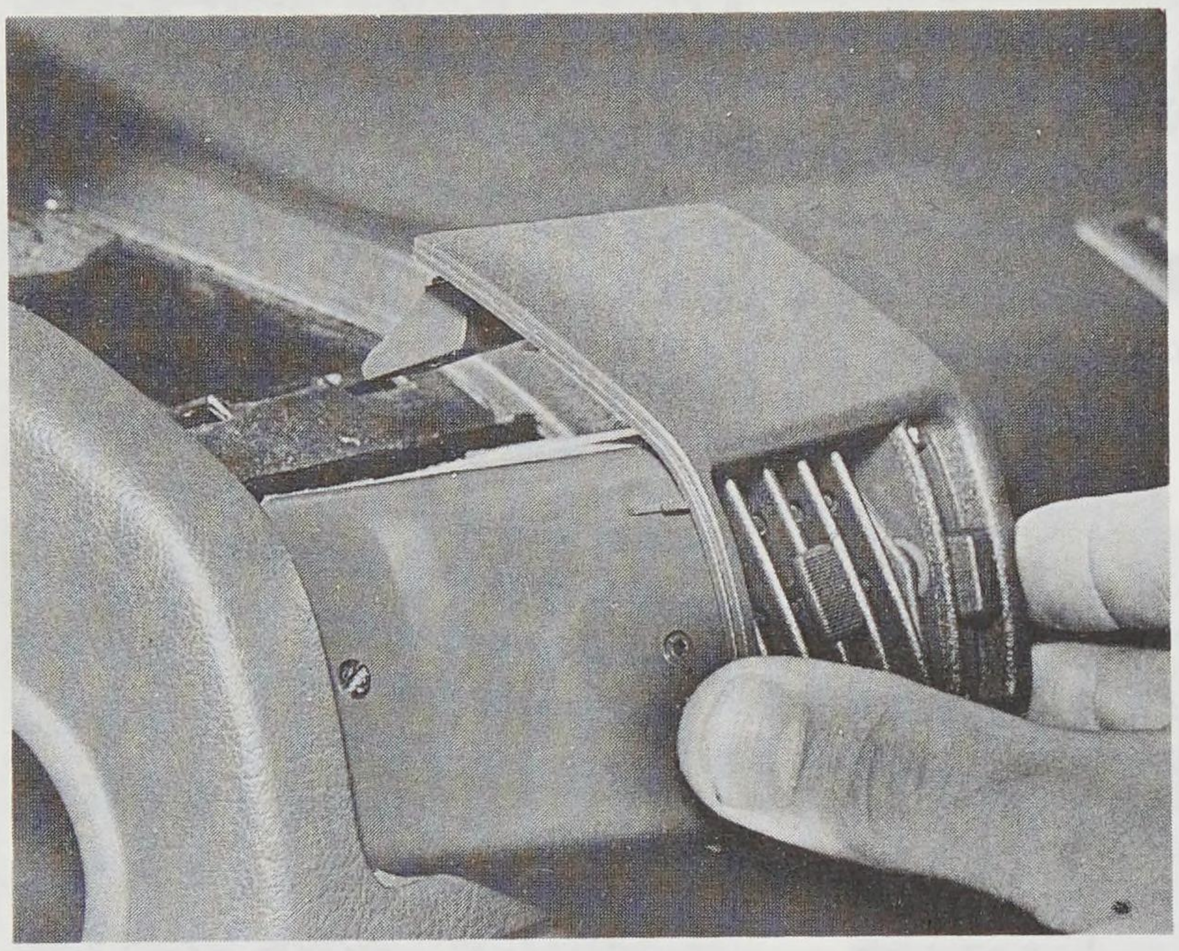
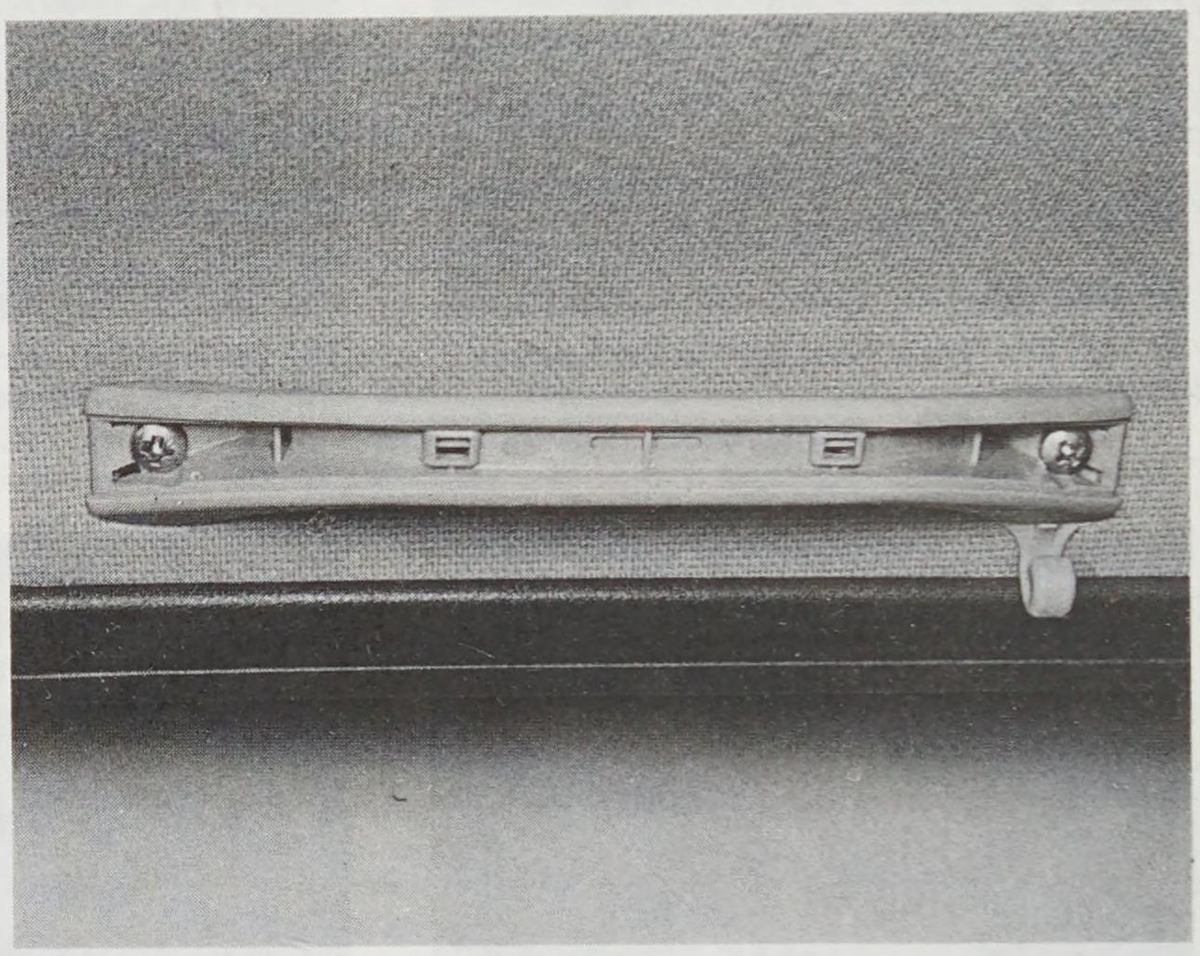


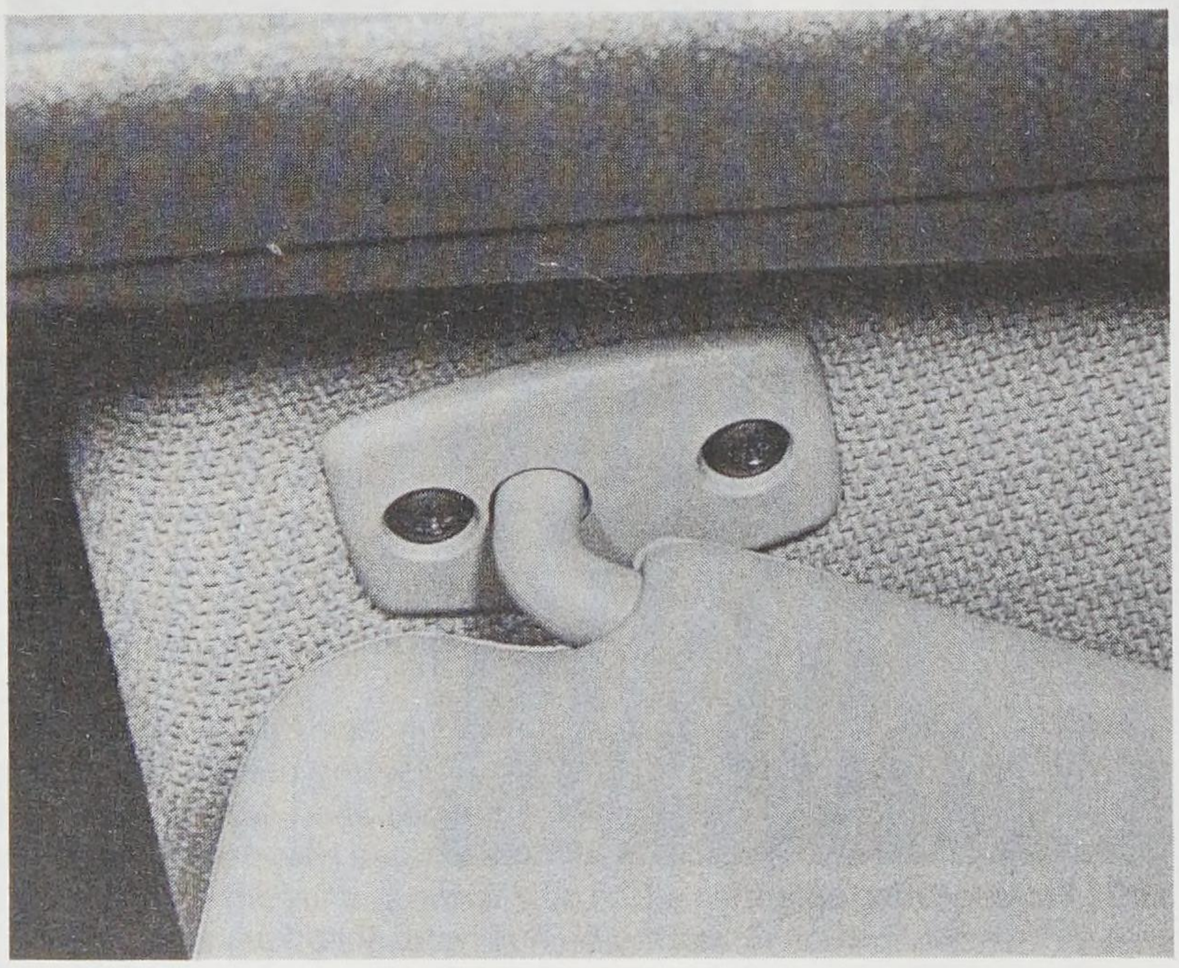
Fig 11.11 Glovebox hinge pins (1) and cover securing screws (2) (Sec 40)



41.2 Removing a face level vent



42.2 Grab handle with plastic insert removed



43.1 Sun visor swivel screws

43 Sun visors – removal and refitting

1 Remove the two screws securing the visor swivel to the roof panel (photo).
2 Lift off the visor.
3 Refit in reverse.

44 Interior trim panels (general) – removal and refitting

1 The following paragraphs describe the removal of those panels which can be a bit awkward to remove, or their removal is not immediately obvious. For the most part, trim panels are retained by screws, plastic clips or plastic buttons. These plastic fixings are easily damaged on removal and it is as well to obtain a supply of replacement fixings prior to trim removal.
2 Unclip and remove the finishing strips above the doors and the kickstrips on the door sills. This will reveal the retaining screws for the A and B-pillar panels (photos).
3 On Estate models, to remove the trim panels from the rear side windows, proceed as follows.

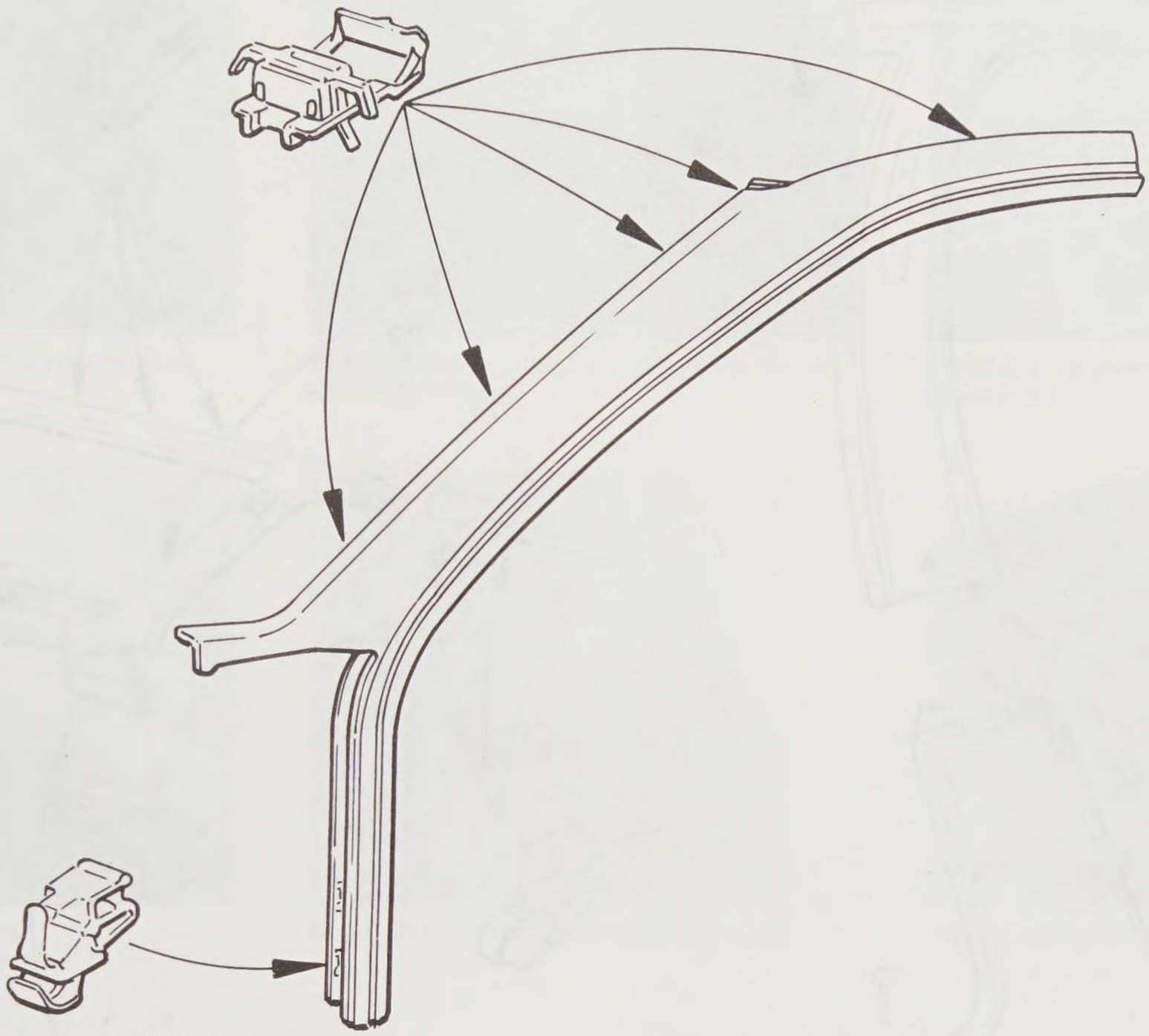

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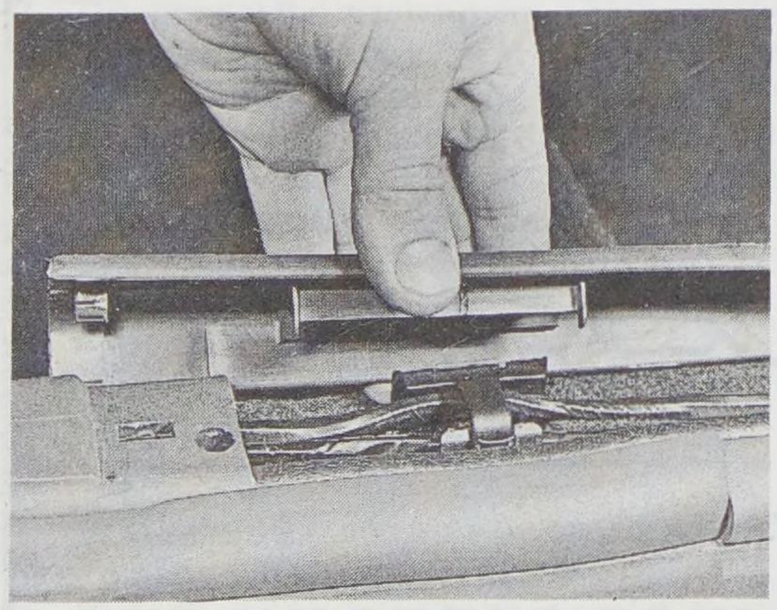
Fig 11.12 A-pillar panel (Sec 44)

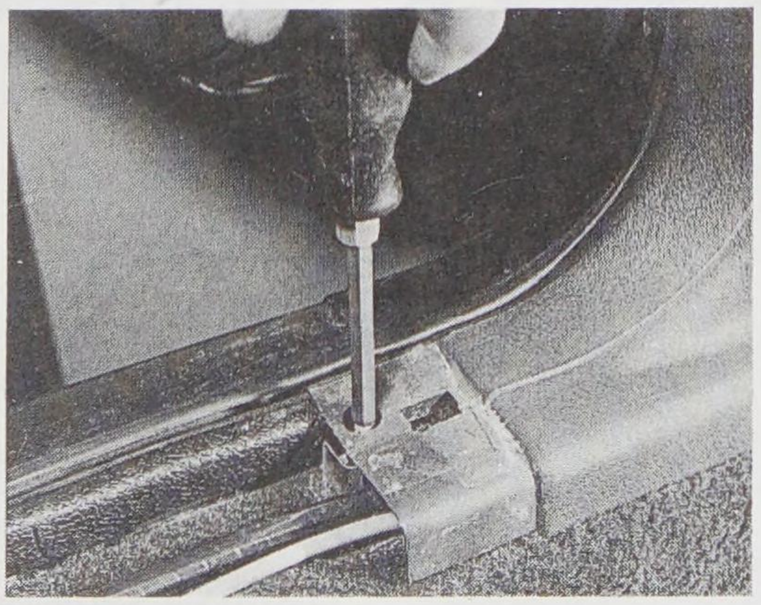
4 Fold the rear seats fully forward and remove the rear courtesy lamp from the C-pillar.
5 Remove all screws from the C-pillar panel and then pull the panel from the clips securing it around the rear side window. It may be necessary to depress the clips with a screwdriver through the hole in the panel (photos).
6 Remove the screws from the seat side cushion panel assembly and withdraw the cushion and panel. The cushion is fixed to the panel by screws (photos).
7 In all cases refitting is the reversal of removal.

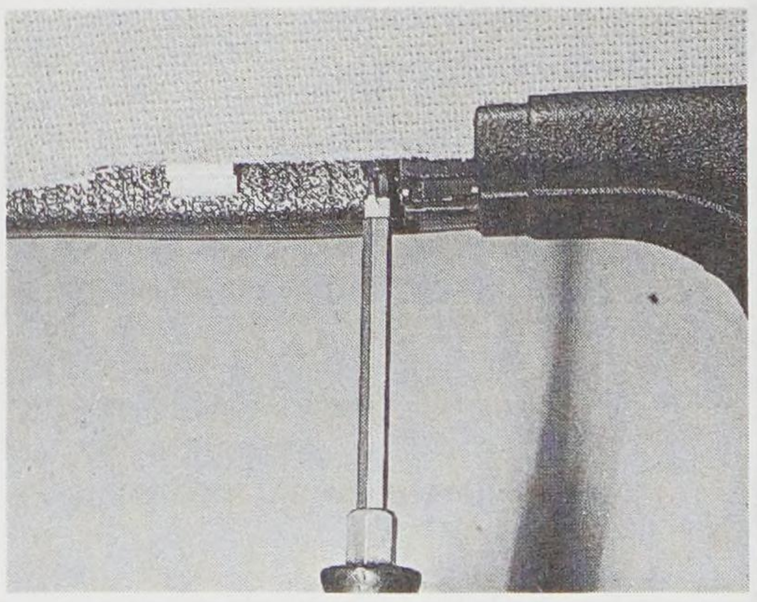
45 Headlining – removal and refitting

Saloon models

1 Remove the sun visors, roof console and grab handles.
2 Unclip the A, B and C-pillar finishing panels.
3 Prise out the rear courtesy lamp(s).
4 Pull down the rear of the headlining, then using a hair drier to soften the adhesive holding the headlining to the roof panel, carefully pull the


44.2A Unclipping a door finishing strip


44.2B An A-pillar trim lower retaining screw being removed ...


44.2C ... followed by the upper screw

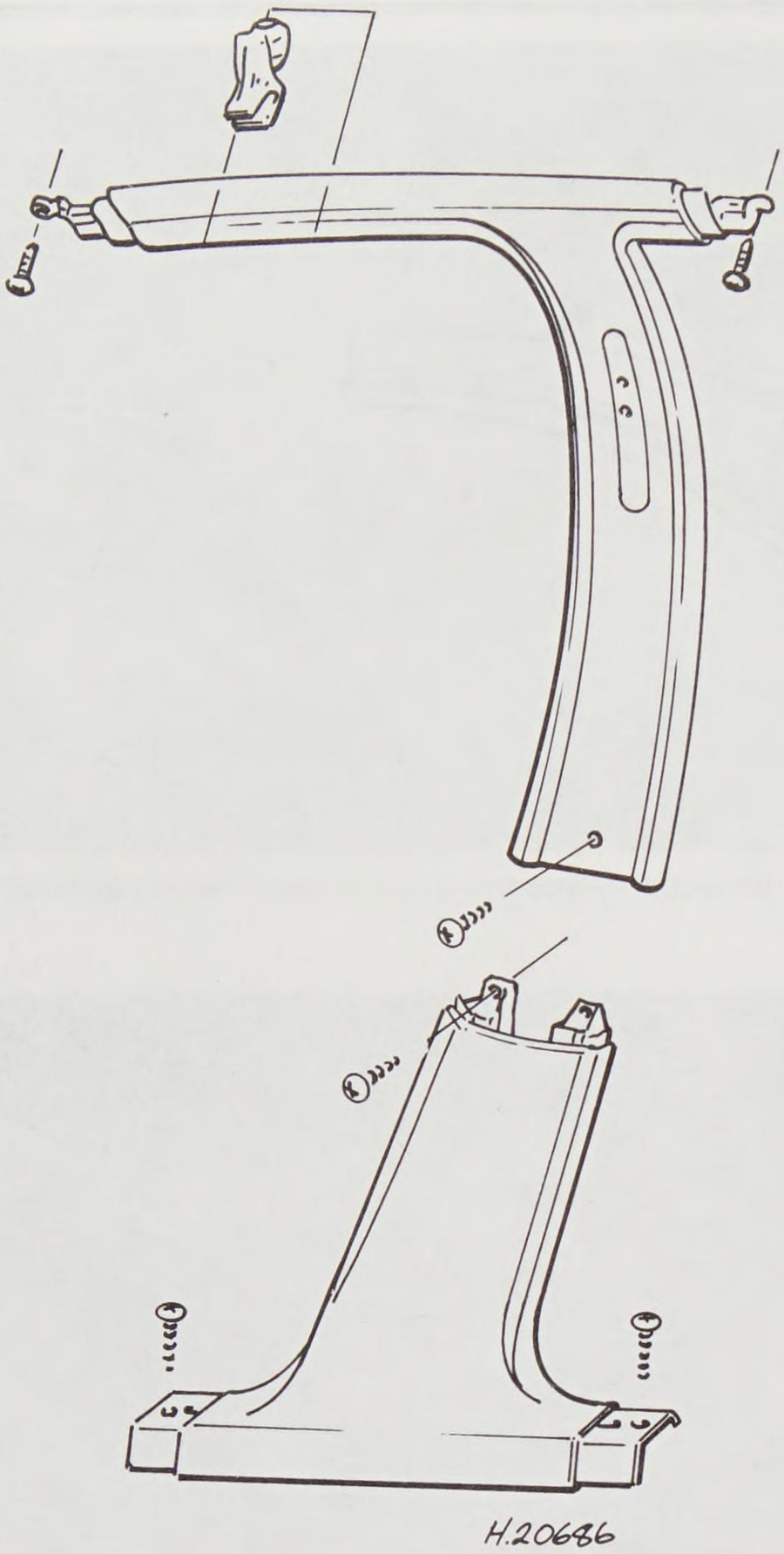


Fig 11.13 B-pillar panel (Sec 44)

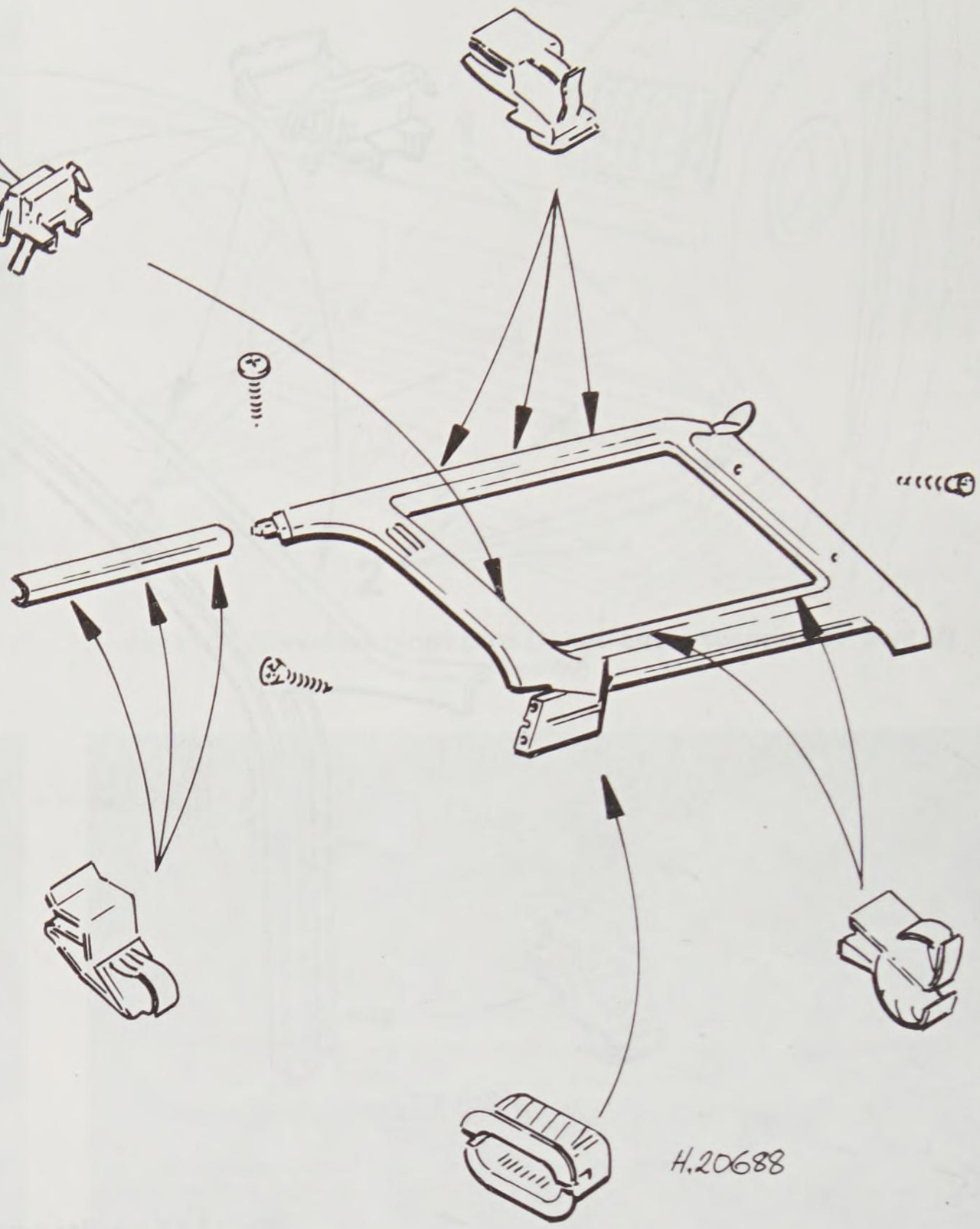


Fig 11.14 C-pillar panel (Saloon) (Sec 44)

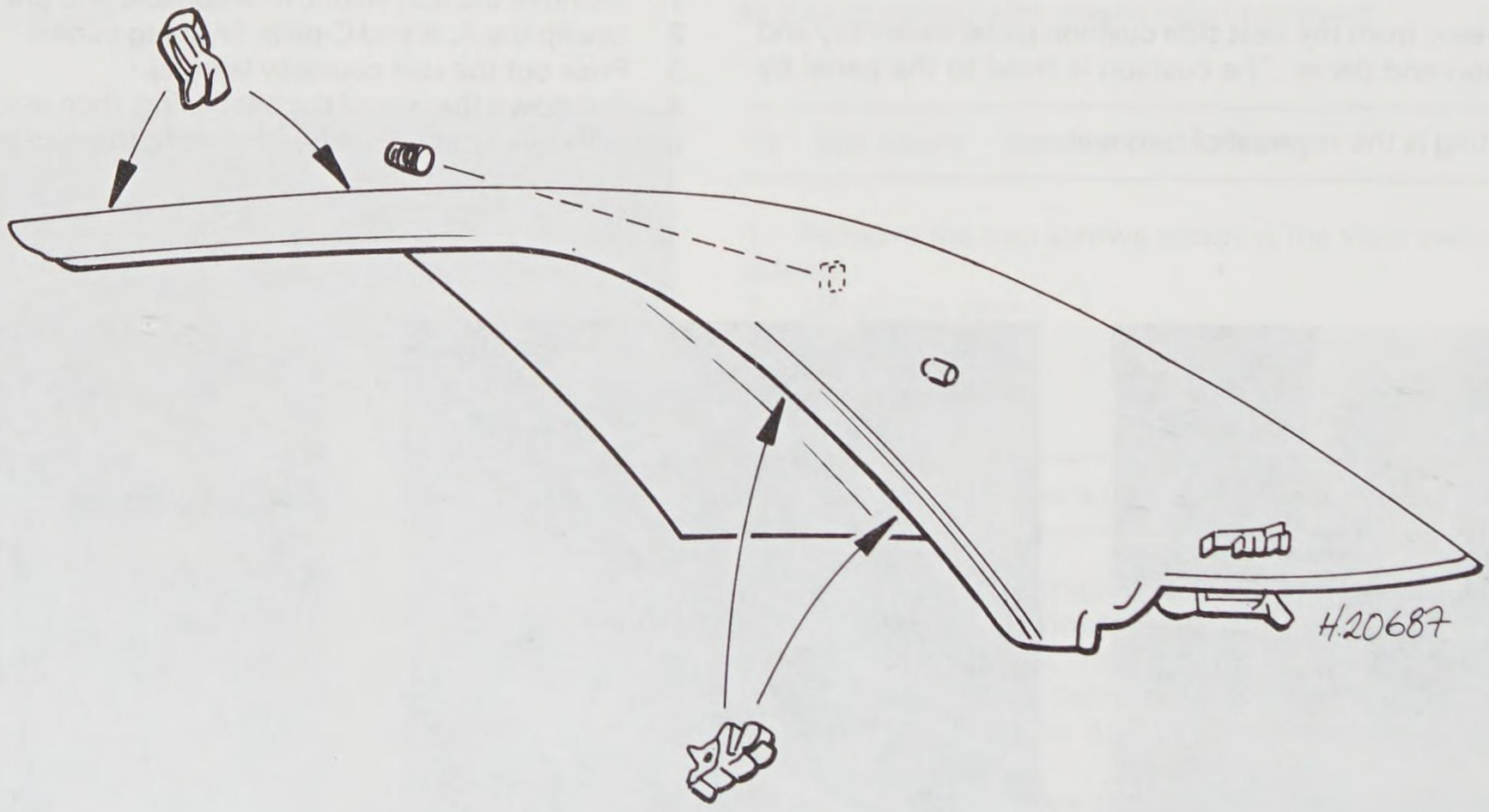
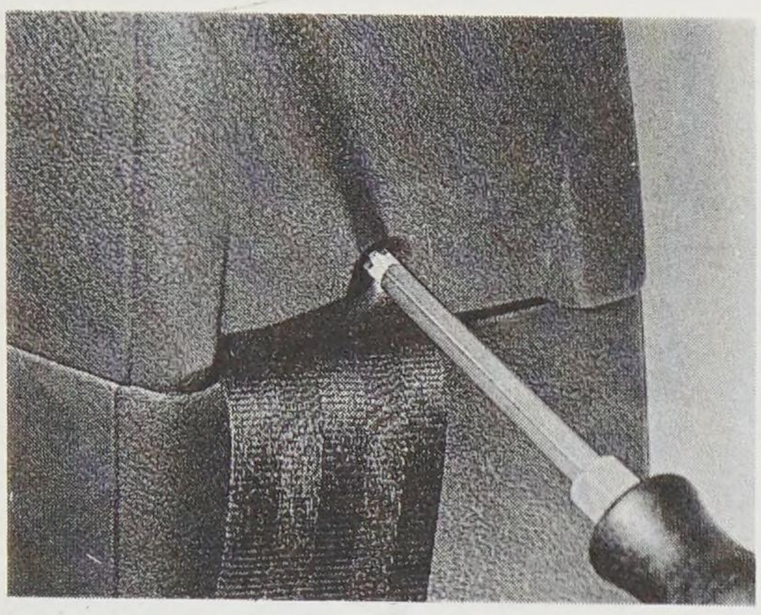
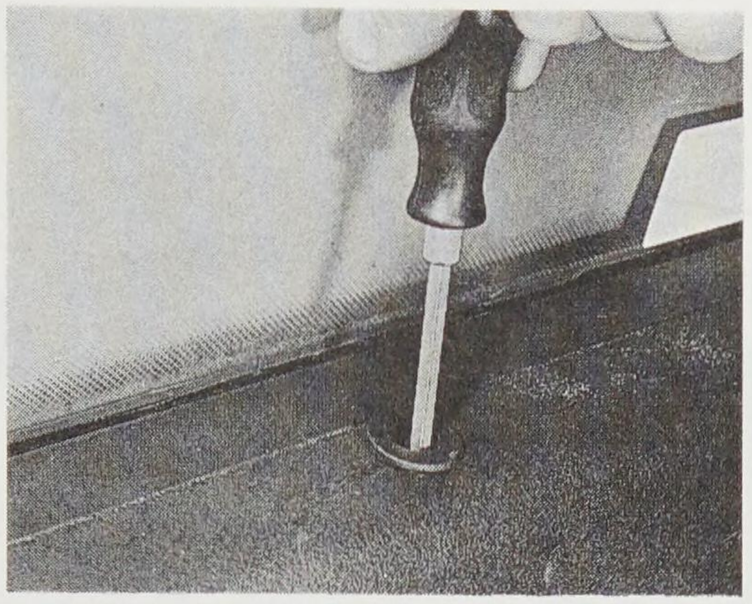


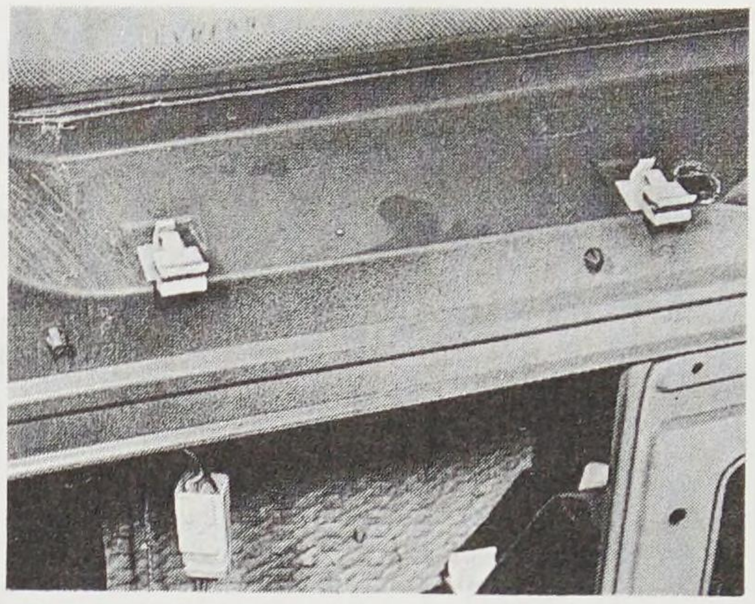
Fig 11.15 C-pillar panel (Estate) (Sec 44)



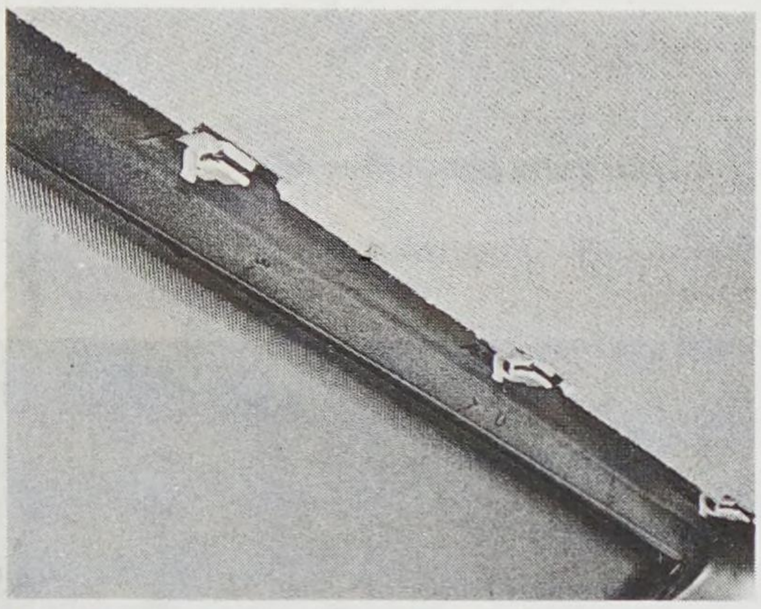
44.2D Removing the lower screw from B-pillar



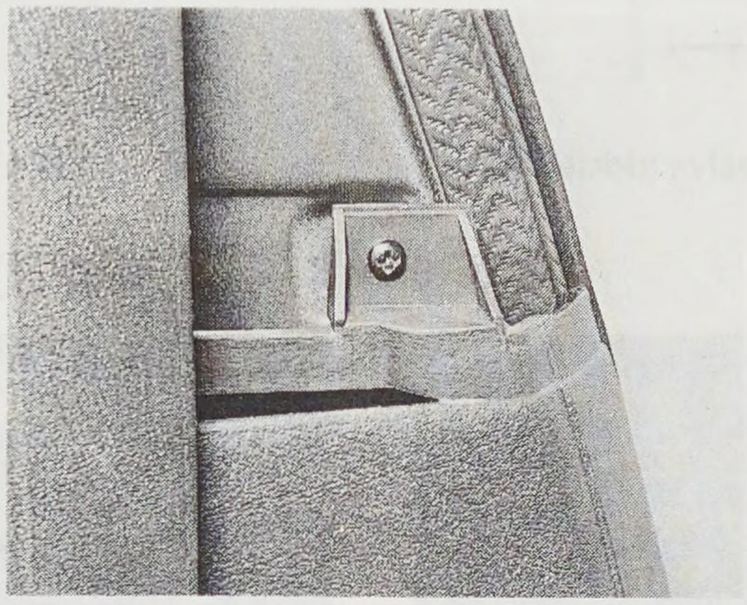
44.5A Releasing a C-pillar trim panel clip on an Estate model



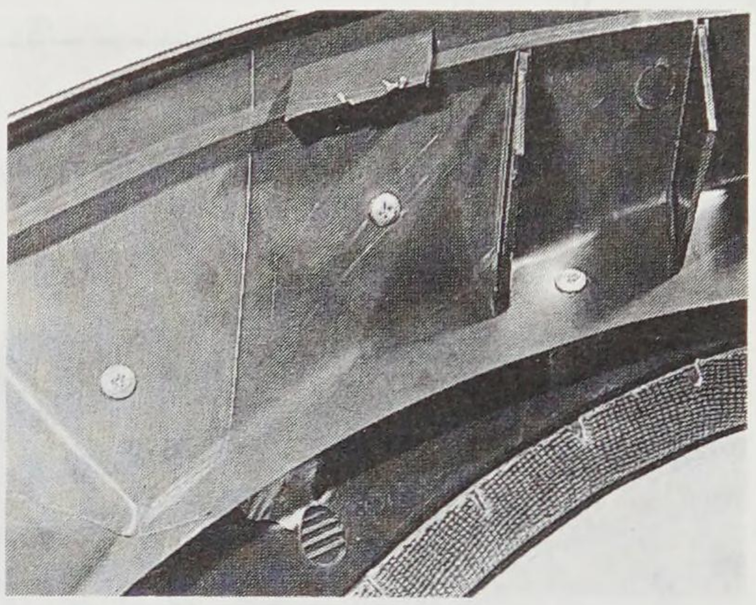
44.5B C-pillar panels removed showing the lower clips ...



44.5C ... and the upper clips



44.6A Seat side cushion securing screw



44.6B Cushion-to-panel screws

headlining down, working from the rear back to the front.
5 Clean all old adhesive from the roof panel.
6 Apply a central square of adhesive to the new headlining (Fig. 11.16) (the adhesive is available from dealers) and to the roof panel.
7 Stick the headlining in position.
8 The remaining operations are a reversal of removal.

Estate models

9 The procedure is similar to that described above, but the rear upper finishing panel above the tailgate opening must also be removed.

46 Air intake grille – removal and refitting

1 Remove the windscreen wiper arms as described in Chapter 12, Section 30.
2 Open the bonnet and disconnect the battery.
3 Disconnect the washer tubing between the grille and washer bottle.
4 Remove the plastic clips at each end of the grille (photo).
5 Remove the grille securing screws (Fig. 11.17) and lift off the grille, noting the separate section at the right-hand end.
6 Refit in reverse order ensuring the rear edge of the grille locates under the windscreen rubber seal.

47 Seat belts – care and maintenance

1 Seat belts are made from nylon webbing and must be kept free from oil or grease, which rots the nylon.
2 Periodically wash the belts in a mild detergent or with a proprietary upholstery cleaner. Keep the belts extended until dry.
3 Inspect the belts for fraying, cuts, splits etc, which if evident will mean their renewal.
4 Check the belt retraction mechanism and renew if found faulty.
5 Seat belts which have been subjected to impact usage must, by law, be renewed.

48 Seat belts – removal and refitting

Front seat belt stalk

1 Remove the stalk retaining bolt from the seat and withdraw the stalk (photo).

Front seat belt upper anchorage

2 Prise the plastic cover from the bolt head (photo).
3 Remove the bolt and release the anchorage.
4 The height adjustment mechanism is removed by extracting the adjuster button and removing the B-pillar upper trim panel.
5 The adjuster retaining screws can then be removed and the mechanism withdrawn from the pillar (photo).

Front inertia reel

6 Remove the B-pillar lower trim panel.
7 Unbolt and withdraw the reel (photo).

Rear belt anchorages

8 Although the rear belt arrangement varies according to specification level, the rear seat belt lower anchorages are all basically similar, being bolted to the wheel arches (photo) or the floor panel. Remove the rear seat backrest or squab to gain access as necessary.

Rear inertia reel (Estate)

9 Fold the rear seat and backrest fully forward.
10 Remove the rear wheel arch trim panel.
11 Unbolt and withdraw the reel from the wheel arch (photo).

Rear inertia reel (Saloon)

12 Undo the bolt securing the reel to the rear parcel shelf and remove the reel.

Refitting (all belts)

13 Refitting is a reversal of removal.

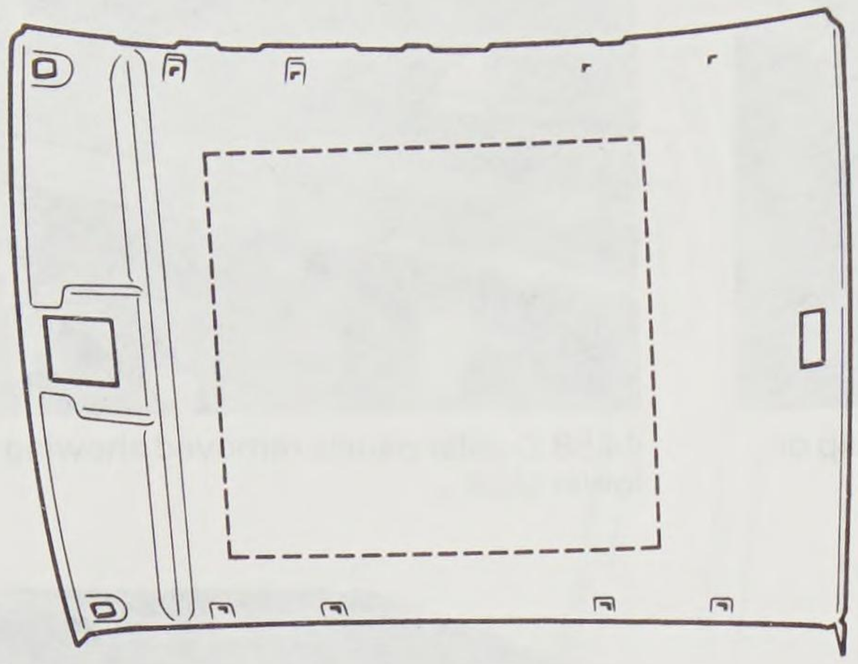


Fig 11.16 Headlining showing area to apply adhesive (dotted area) (Sec 45)

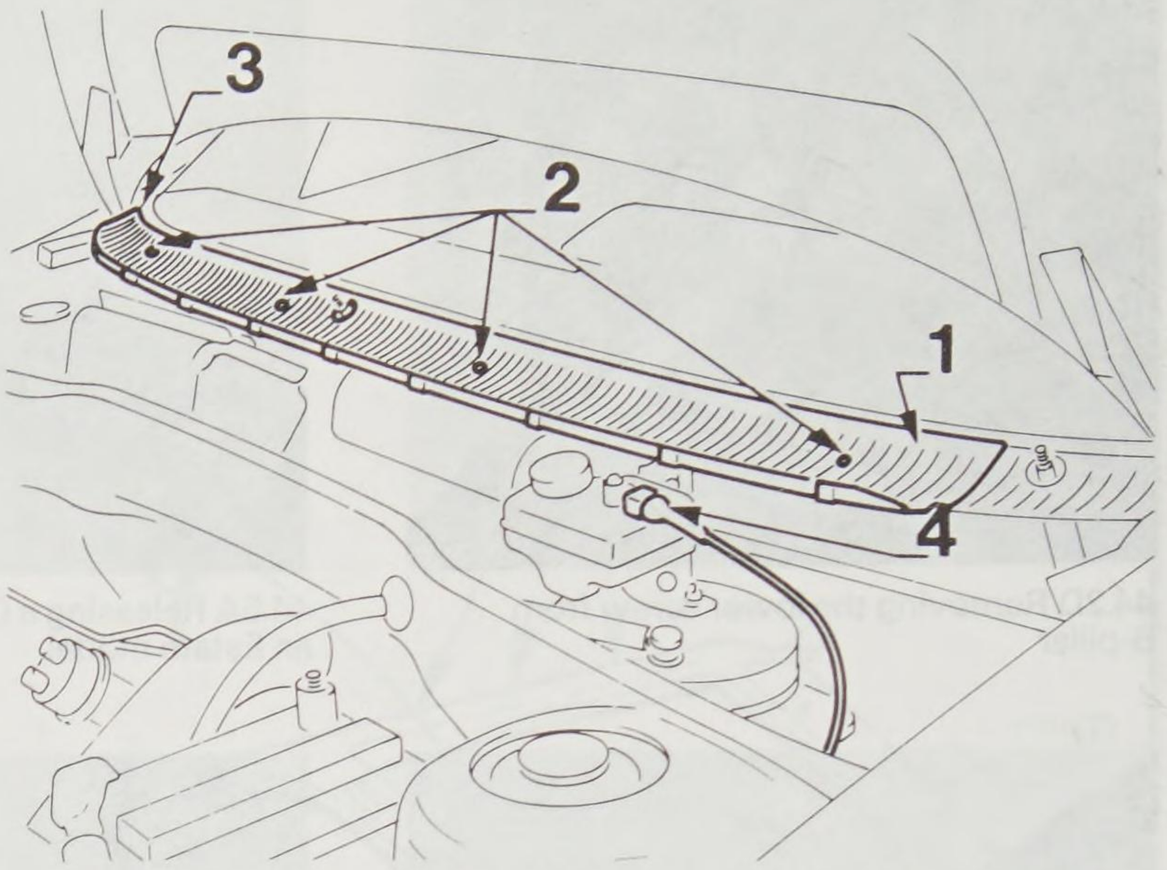
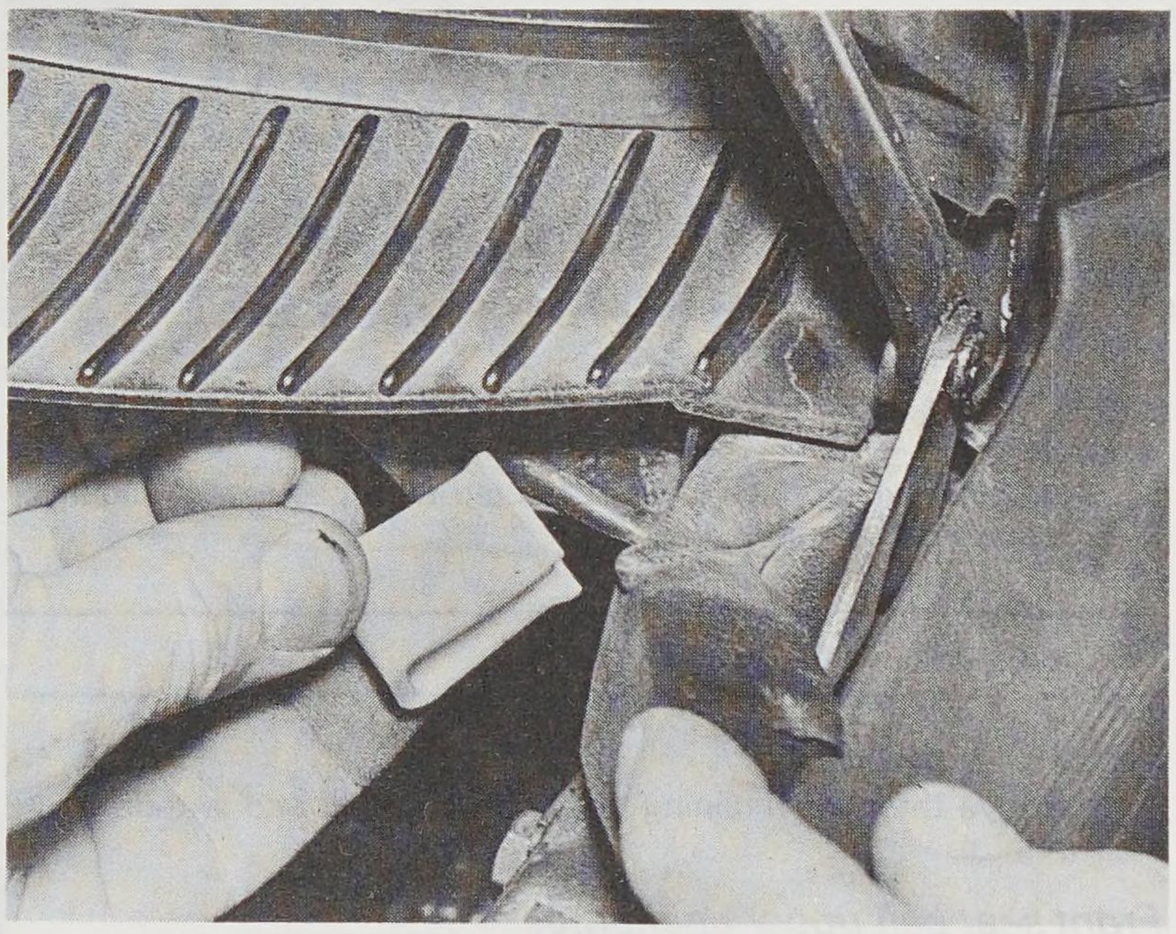
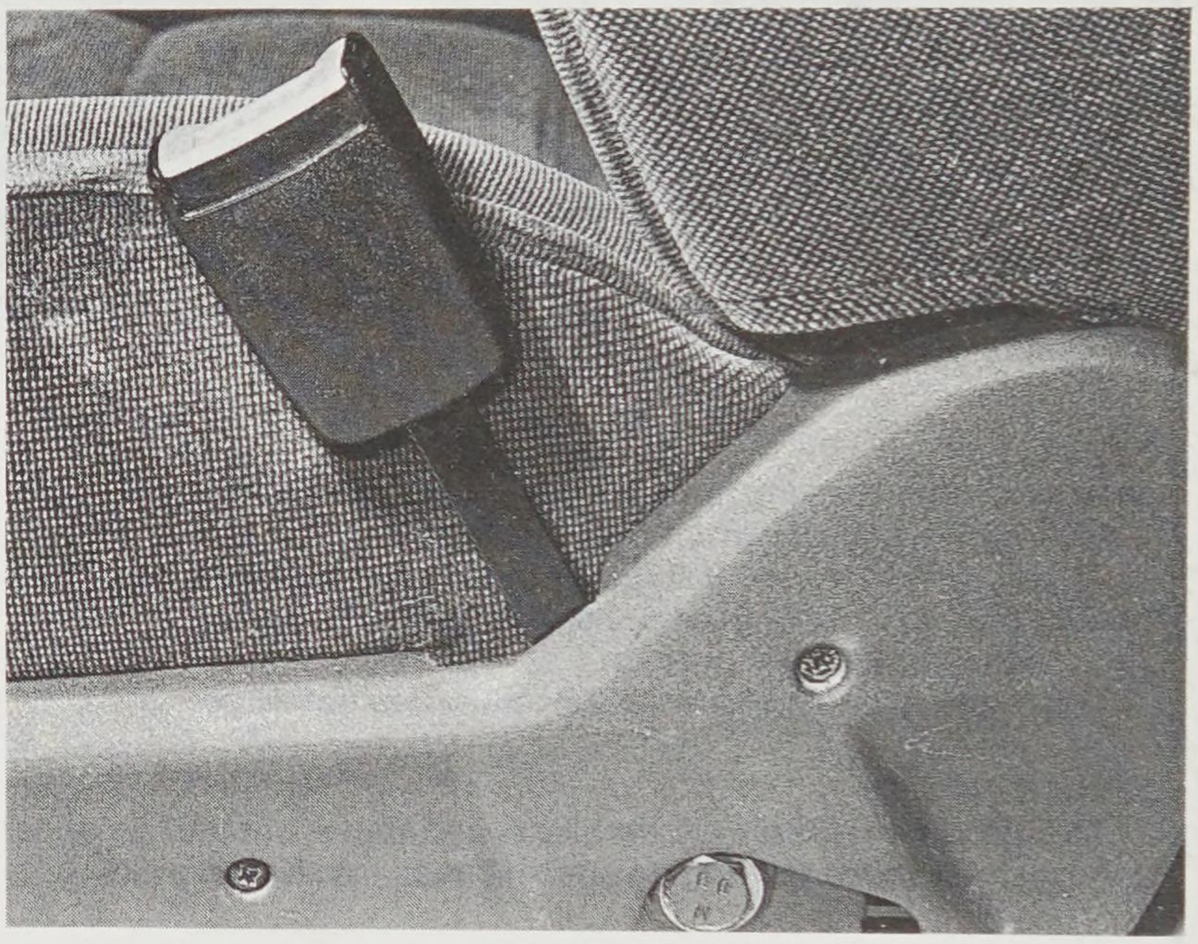


Fig 11.17 Air intake grille panel (Sec 46)

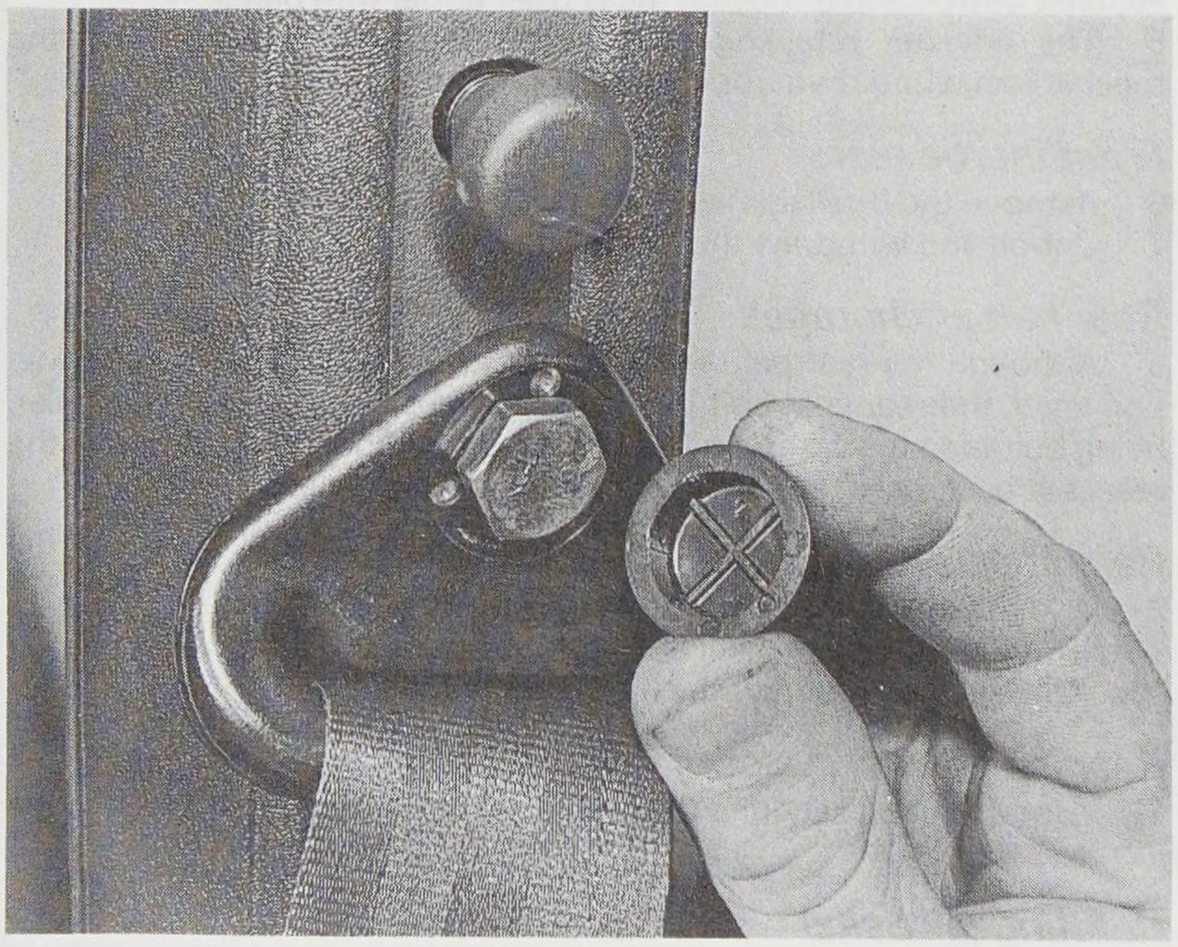
1 *Grille*
2 *Screws*
3 *End panel*



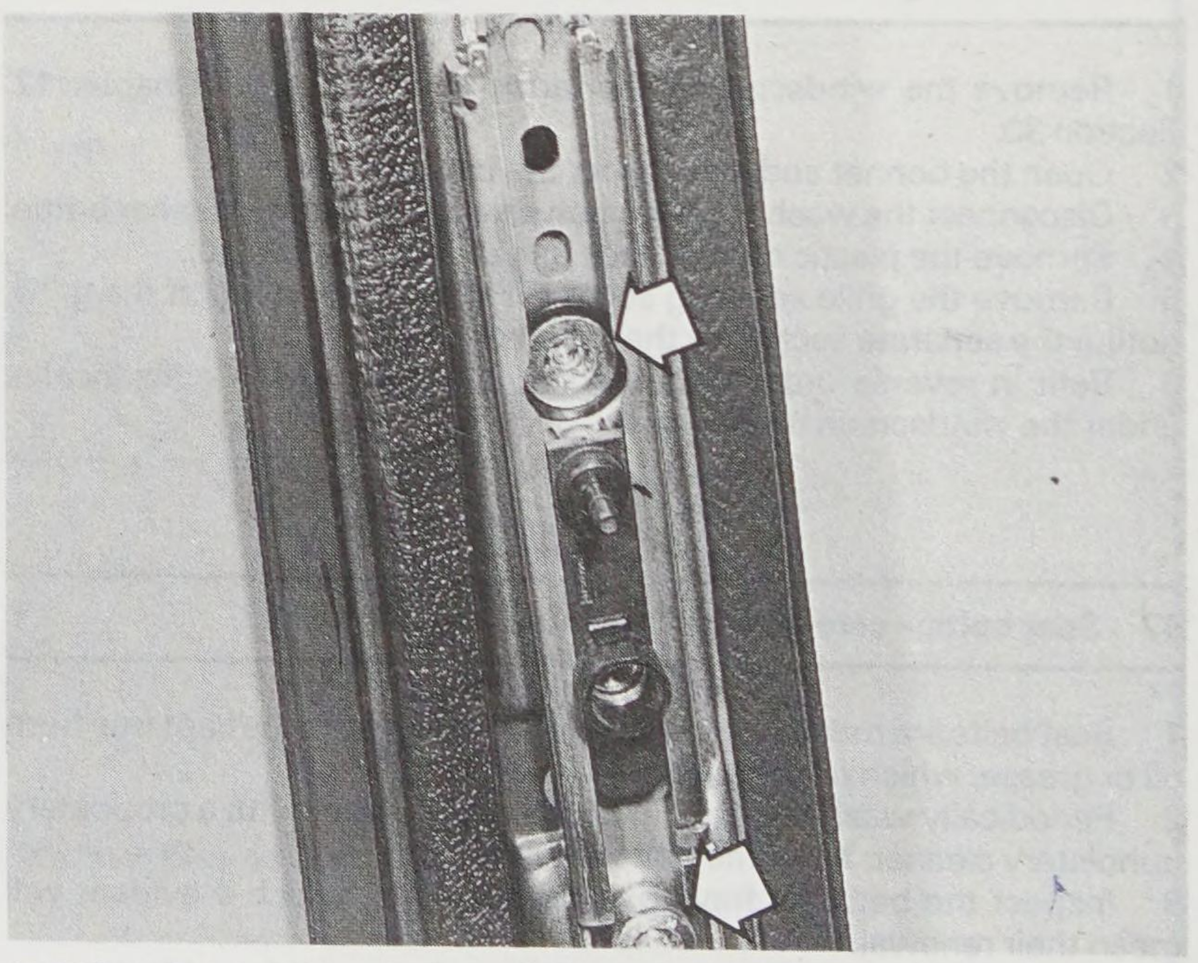
46.4 Removing a plastic clip from air intake grille



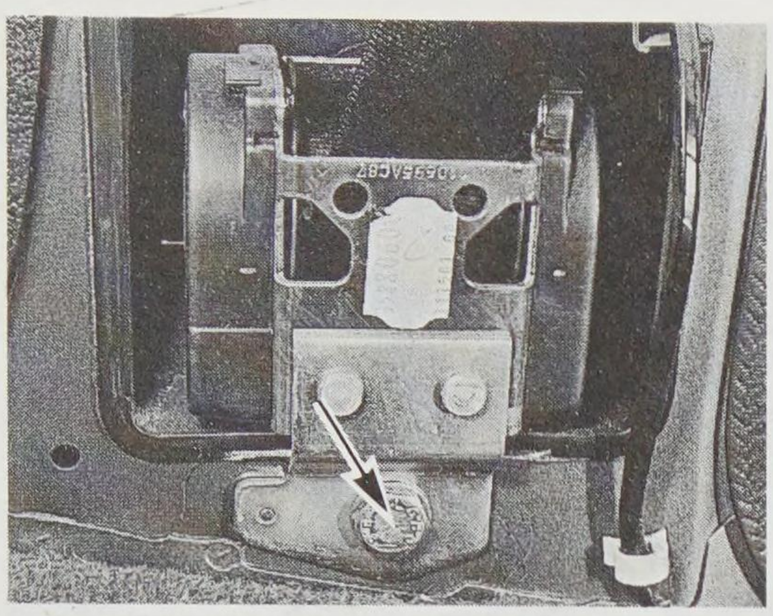
48.1 Seat belt stalk retaining bolt



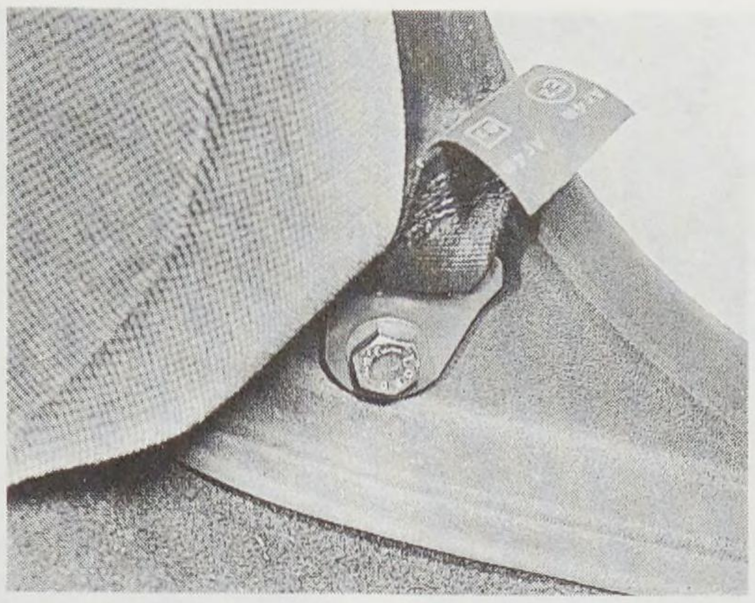
48.2 Removing a plastic cover from bolt head



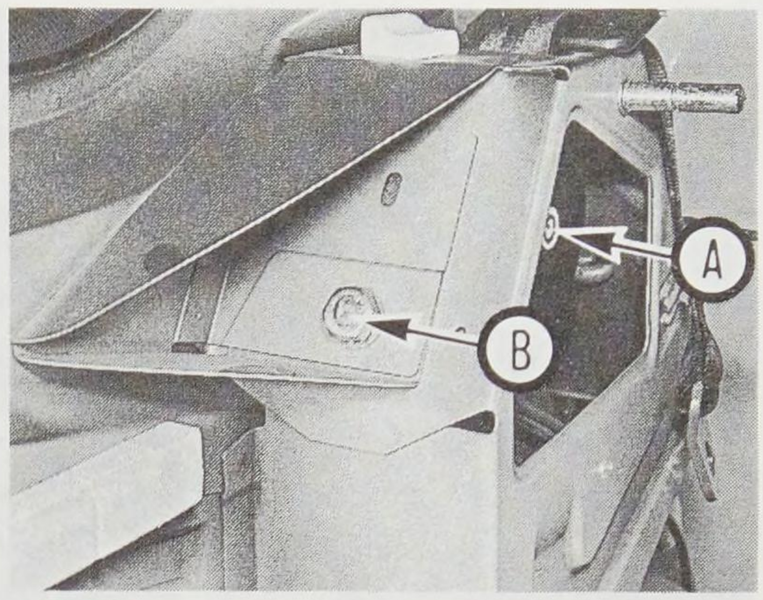
48.5 Seat belt height adjuster securing screws (arrowed)



48.7 Seat belt reel securing bolt (arrowed)



48.8 Rear seat belt anchorage



48.11 Rear seat belt inertia reel (A) and securing bolt (B) on Estate model

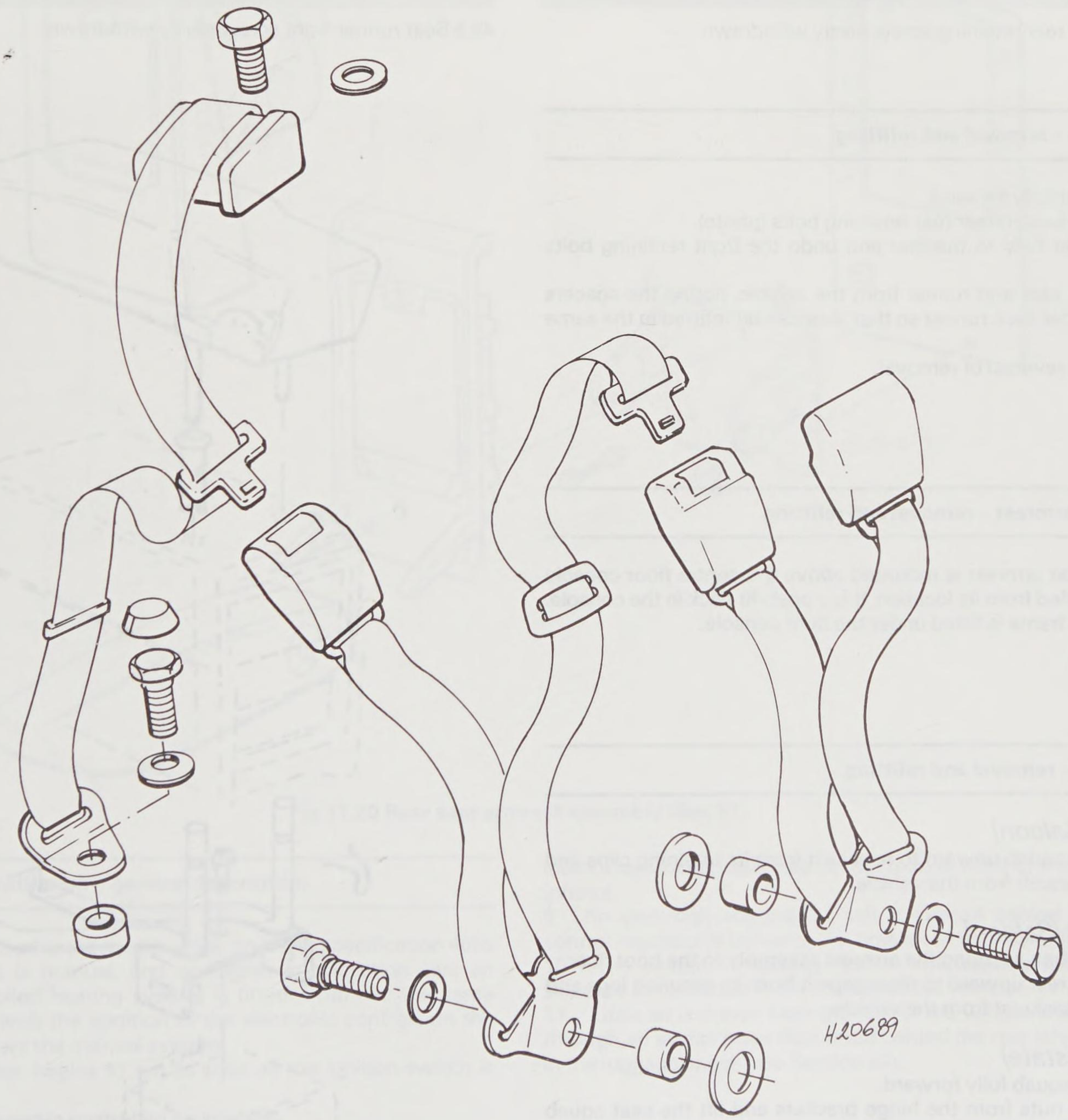
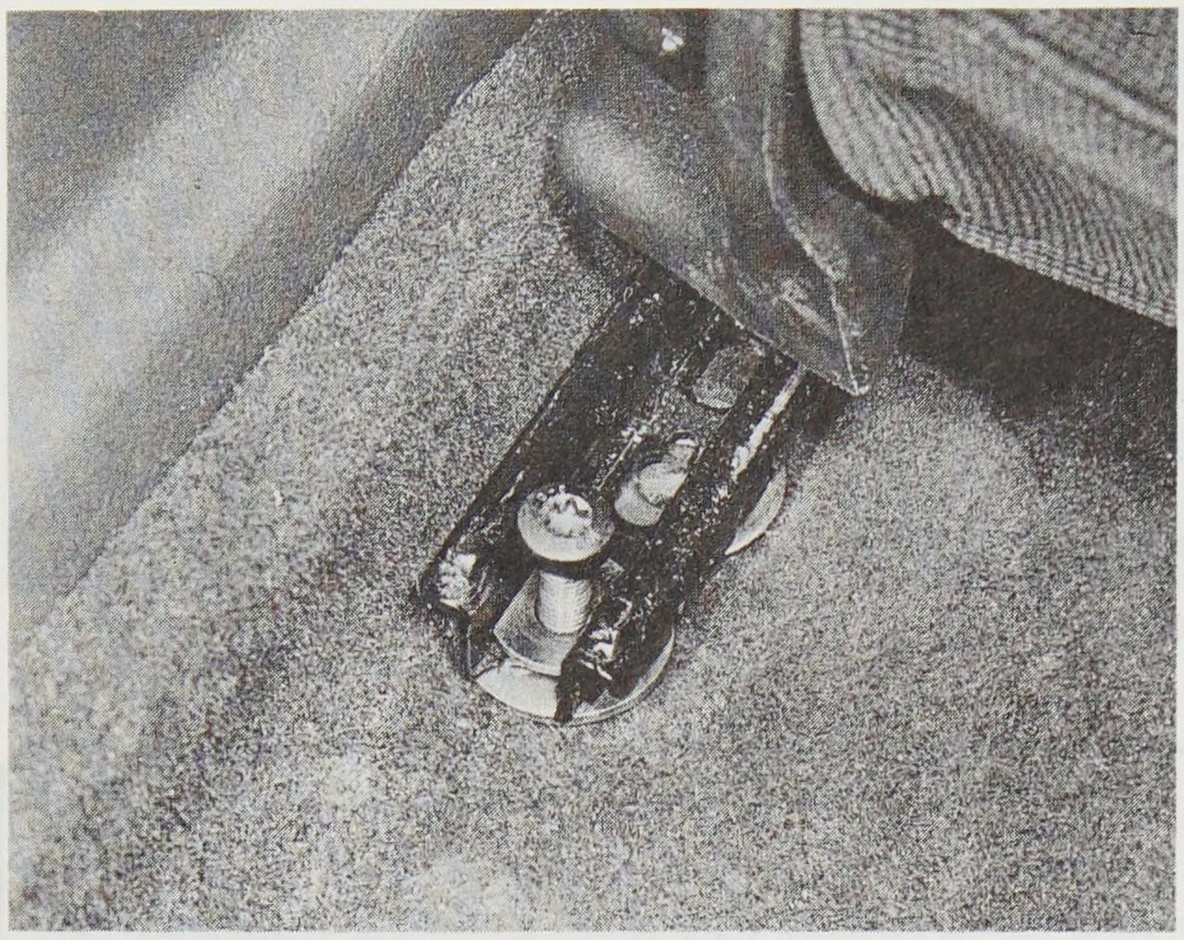
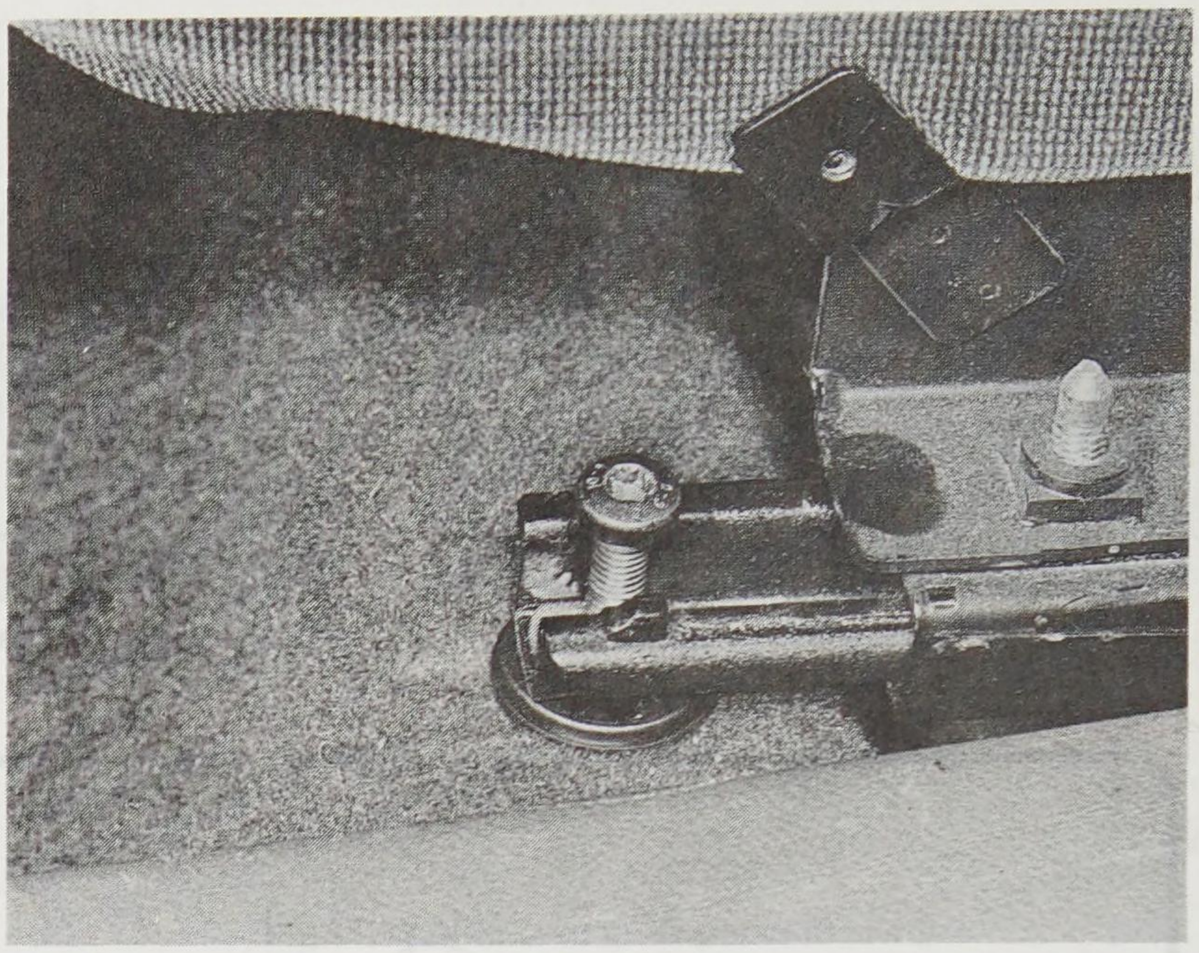


Fig 11.18 Typical rear seat belt arrangement (Sec 48)



49.2 Seat runner rear retaining screw partly withdrawn



49.3 Seat runner front screw partly withdrawn

49 Front seats – removal and refitting

1 Slide the seat fully forward.
2 Remove the seat runner rear retaining bolts (photo).
3 Slide the seat fully to the rear and undo the front retaining bolts (photo).
4 Remove the seat and runner from the vehicle, noting the spacers and washers under each runner so that they can be refitted in the same position.
5 Refitting is a reversal of removal.

50 Front seat armrest – removal and refitting

1 The front seat armrest is mounted above the centre floor console and is simply pulled from its location. It is a push-fit back in the console.
2 The support frame is fitted under the floor console.

51 Rear seats – removal and refitting

Seat squab (Saloon)

1 Pull the seat squab upward to release it from its retaining clips and manoeuvre the squab from the vehicle.

Seat backrest (Saloon)

2 Remove the bolt securing the armrest assembly to the boot floor.
3 Pull the backrest upward to disengage it from its securing lugs and manoeuvre the backrest from the vehicle.

Seat squab (Estate)

4 Tilt the seat squab fully forward.
5 Remove the nuts from the hinge brackets and lift the seat squab from the vehicle (photo).

Seat backrest (Estate)

6 Release the backrest retaining locks and tilt the backrest forward.
7 Remove the nuts from the hinge brackets on the wheel arches and lift the backrest from the vehicle. On split rear seats, disengage the inner pivot from its bracket to remove each section individually (photos).
8 Refitting of all types is a reversal of removal.

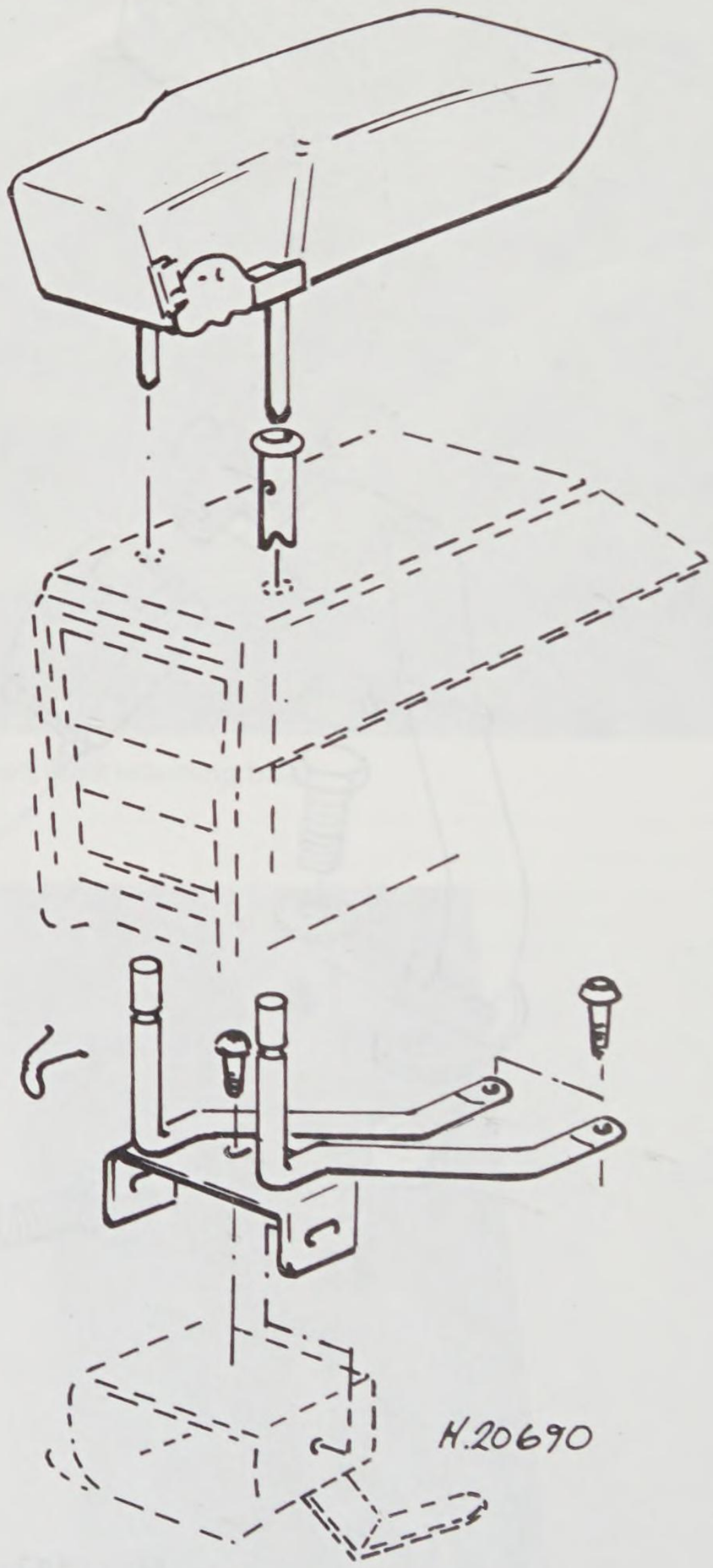
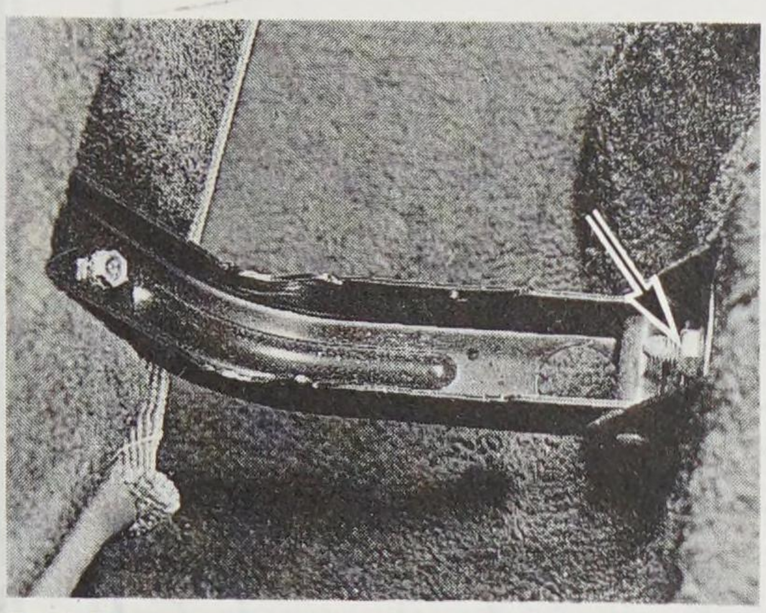
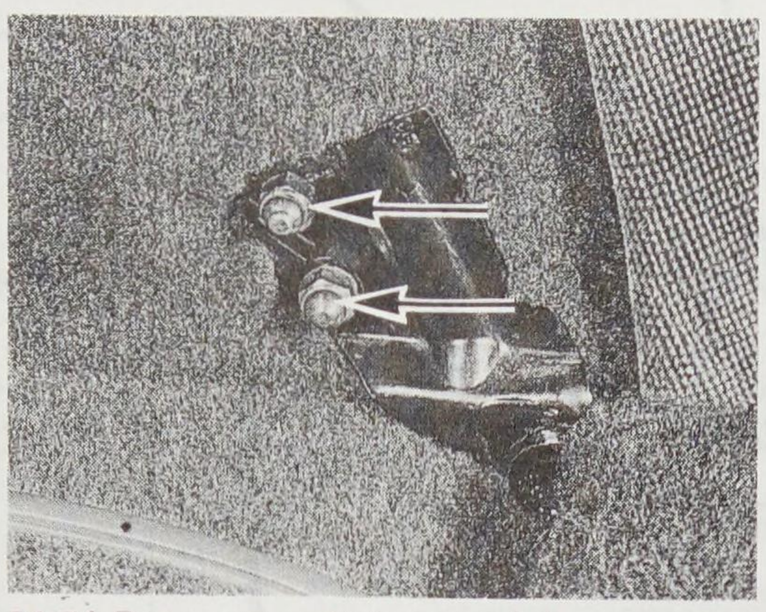


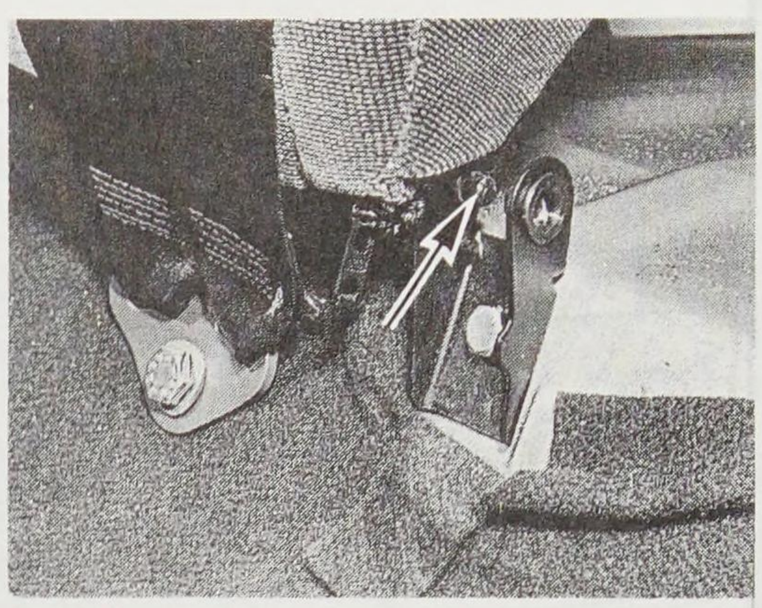
Fig 11.19 Front seat armrest assembly (Sec 50)



51.5 Rear seat squab hinge retaining nut (arrowed)



51.7A Rear seat rest hinge retaining screws (arrowed)



51.7B Inner pivot pin on split rear seats (arrowed)

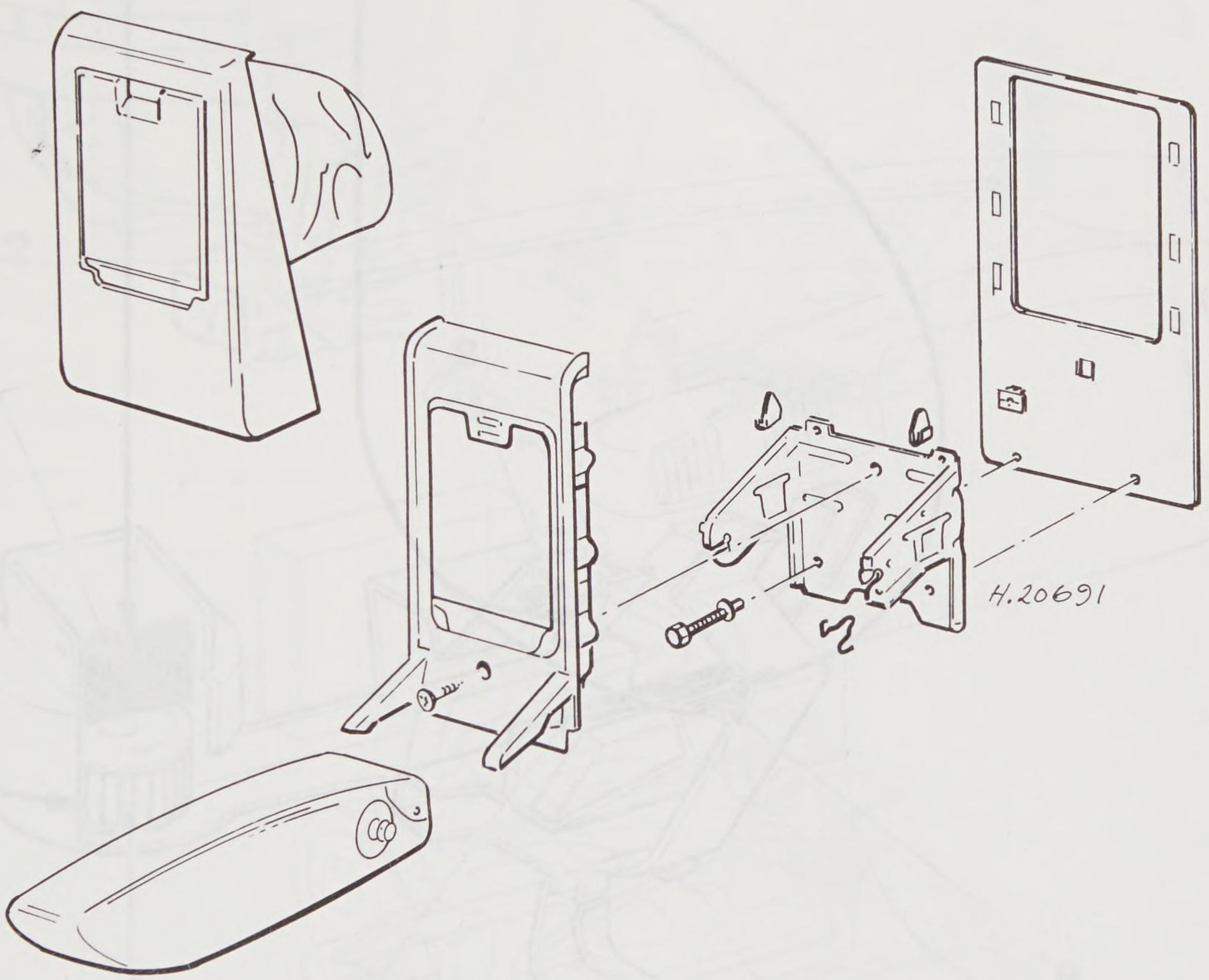


Fig 11.20 Rear seat armrest assembly (Sec 51)

52 Heating and ventilation – general description

1 Two types are fitted to the model range, on lower specification 405s the heating system is manual, and on higher specification cars an electronically controlled heating system is fitted. Both use the same basic components, with the addition of the electronic controls on the latter. Fig. 11.21 shows the manual system.
2 The blower motor begins to run as soon as the ignition switch is turned to + ACC.
3 Blower motor speed is controlled by knob (4).
4 Incoming cold air is controlled by the slider (2).
5 The desired air temperature is obtained by mixing cold air with warm, achieved by control (5) and flap (6).
6 Air distribution is controlled by knob (7) and flaps (8) and (9).
7 There is no water valve in the system, air temperature being controlled purely by flap (6).
8 On models with electronically controlled heating, a temperature probe is fitted to the air inlet duct in front of the blower motor and an interior sensor is positioned on the facia in front of the passenger seat (photo).
9 An electronic thermostat unit is located behind the facia and a control regulator is bolted to the bottom of the heater housing.
10 The electronic heating system will automatically maintain the selected temperature in the interior of the vehicle.
11 Stale air is drawn from the rear of the vehicle and vented outside through an air extractor duct fitted behind the rear left-hand trim panel in the luggage space (see Section 67).

53 Heater control panel – removal and refitting

1 Disconnect the battery negative terminal.
2 Remove the instrument panel as described in Chapter 12, Section 18.
3 Disconnect the switches and digital clock at the top of the centre console.

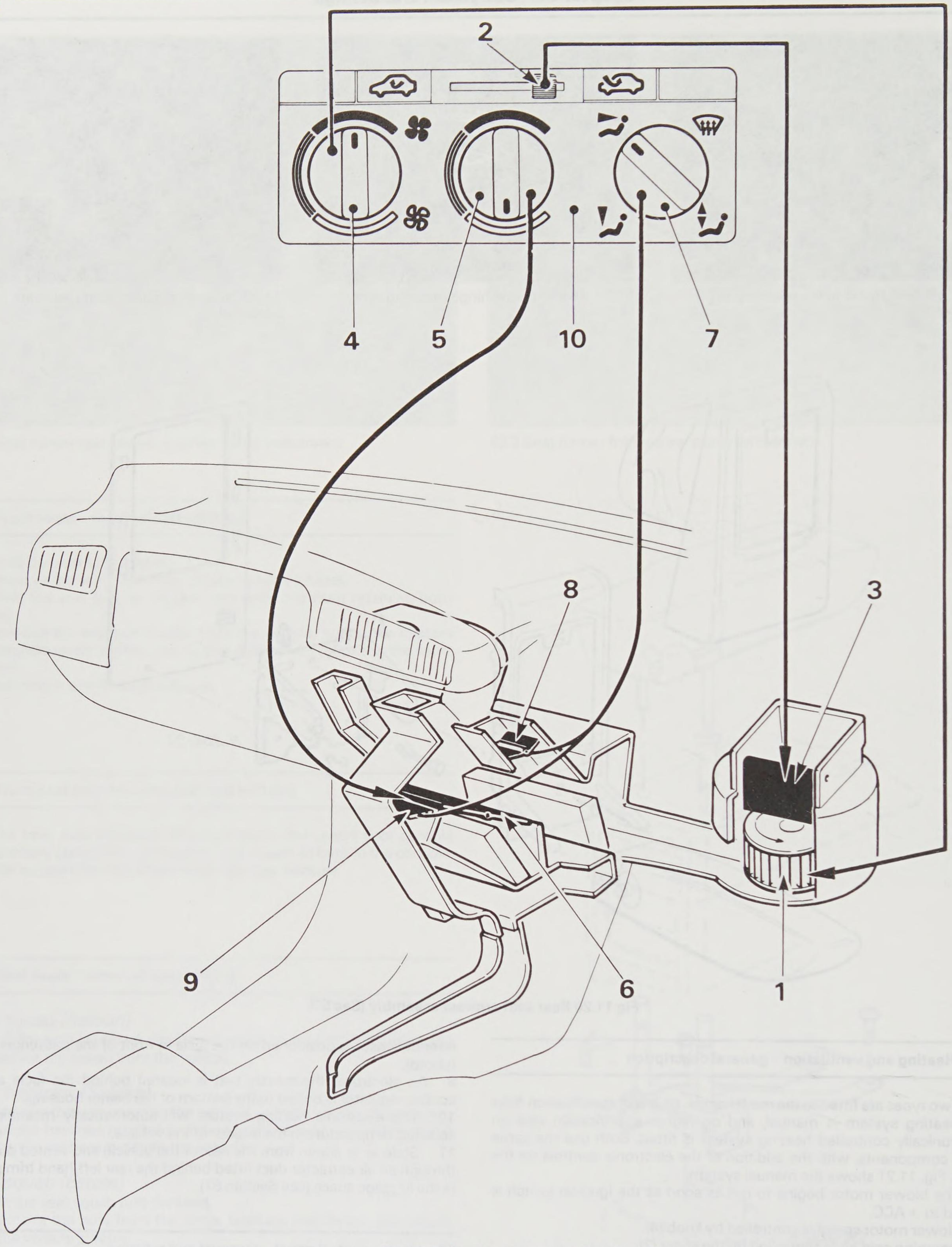


Fig 11.21 Heater control cables (Sec 52)

1 *Blower motor (fan*
2 *Air inlet slider control*
3 *Air inlet flap*
4 *Blower motor (fan) speed control*
5 *Hot/cold air mixer control*
6 *Hot/cold air mixer flap*
7 *Air distribution control*
8 *Air distribution flap*
9 *Air distribution flap*
10 *Control panel*

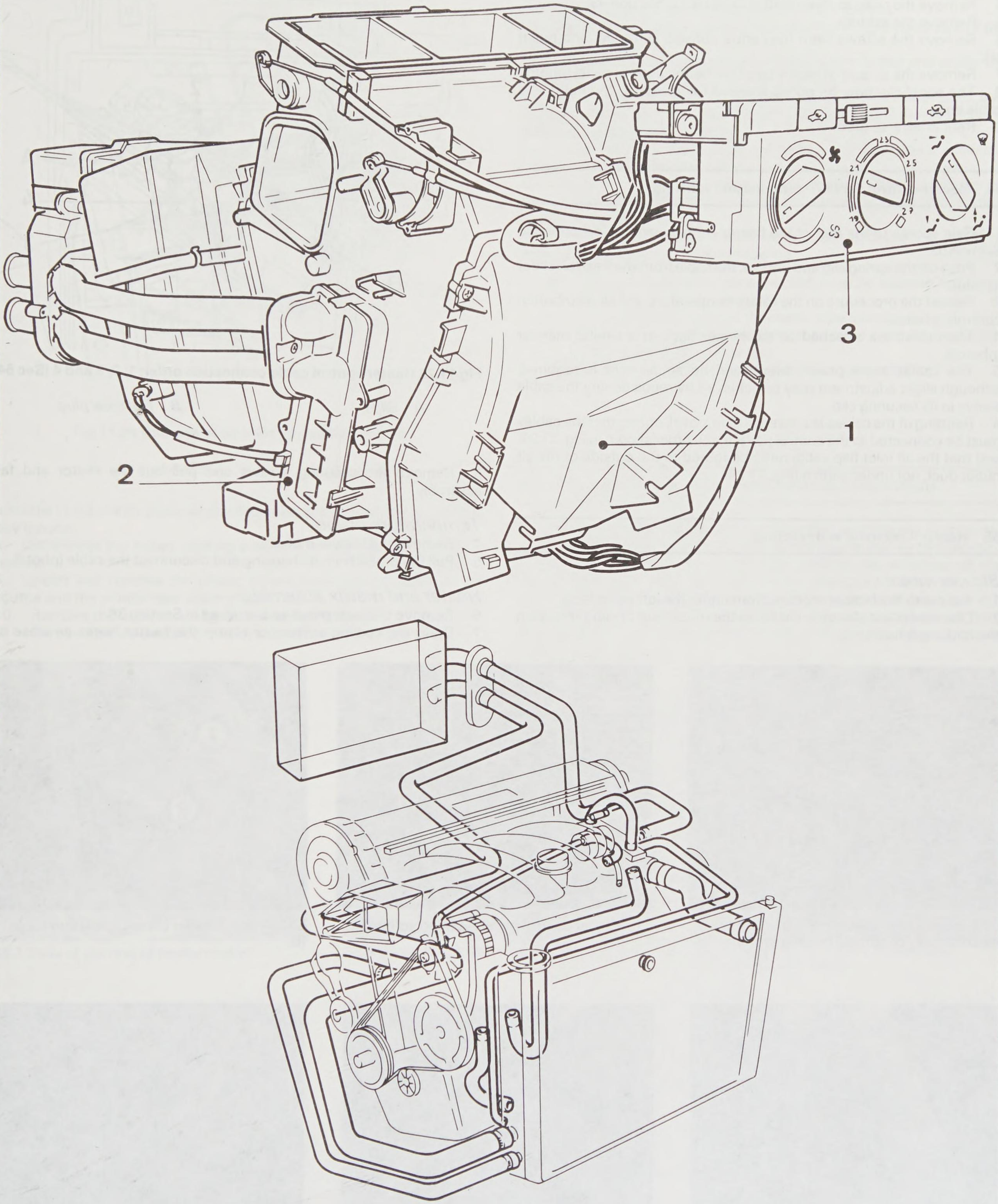


Fig 11.22 Heater assembly (Sec 52)

1 Heater unit
2 Heater matrix
3 Control panel

4 Remove the radio as described in Chapter 12, Section 49.
5 Remove the ashtray.
6 Remove the screws from the centre console surround, and pull it off.
7 Remove the screws at each side of the heater control panel (photo).
8 The panel can now be pulled forward for access to the bulbs and cable ends.
9 Refit in reverse order.

54 Heater control cables – removal and refitting

1 Gain access to the rear of the heater control panel as described in Section 53.
2 Prise off the spring clip and unhook the cable from the fresh air slider (photo).
3 Repeat the procedure on the rotary temperature and air distribution controls (photo).
4 The cables are attached to the heater flaps in a similar manner (photos).
5 The cables are a preset length and no adjustment is required, although slight adjustment may be achieved by repositioning the cable sleeve in its securing clip.
6 Refitting of the cables is a reversal of removal, noting that the cables must be connected to the control panel in the order shown in Fig. 11.23, and that the air inlet flap cable must be routed to the outside of the air outlet duct, not underneath it (Fig. 11.24).

55 Heater – removal and refitting

Blower motor

1 Access to the blower motor is from under the left-hand facia.
2 Disconnect the electrical cables to the motor and unclip them from the housing (photo).

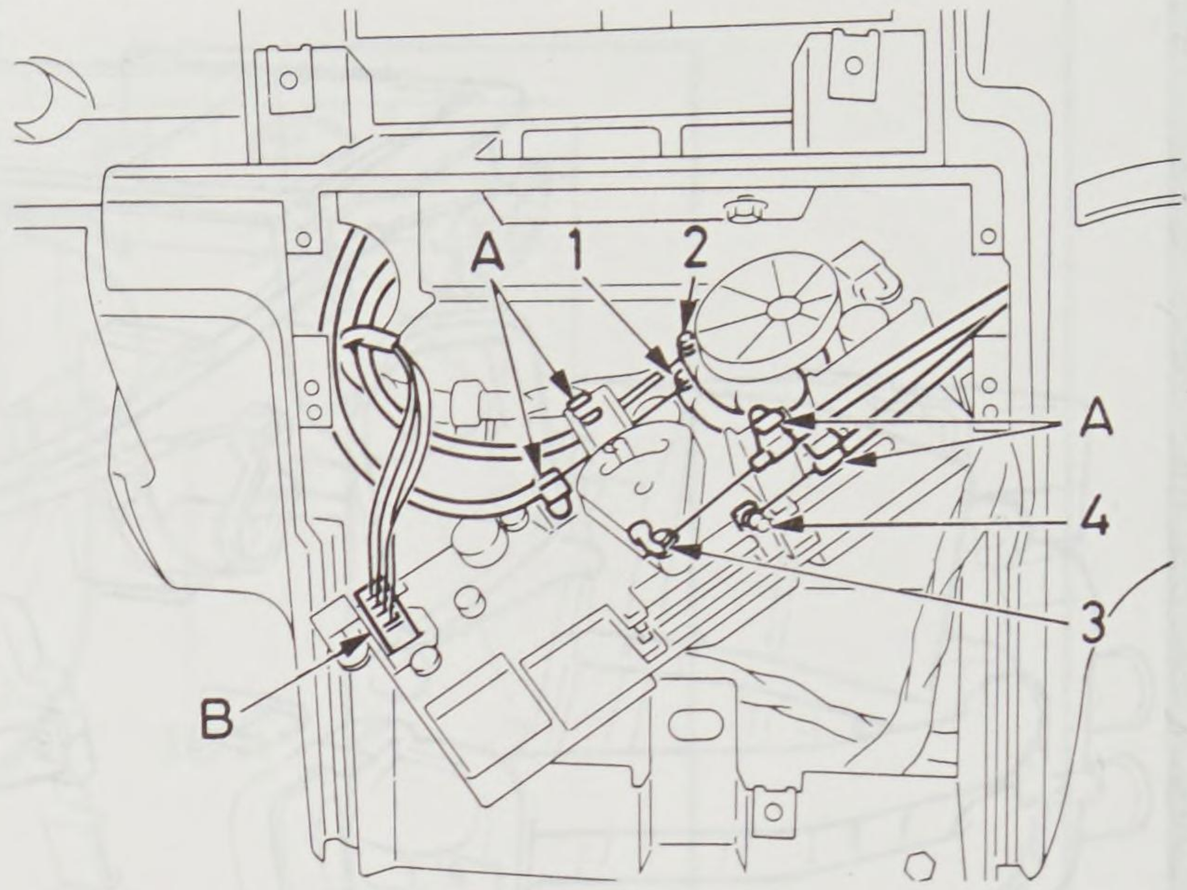


Fig 11.23 Heater control cable connection order: 1, 2, 3 and 4 (Sec 54)

A Clips *B Electrical plug*

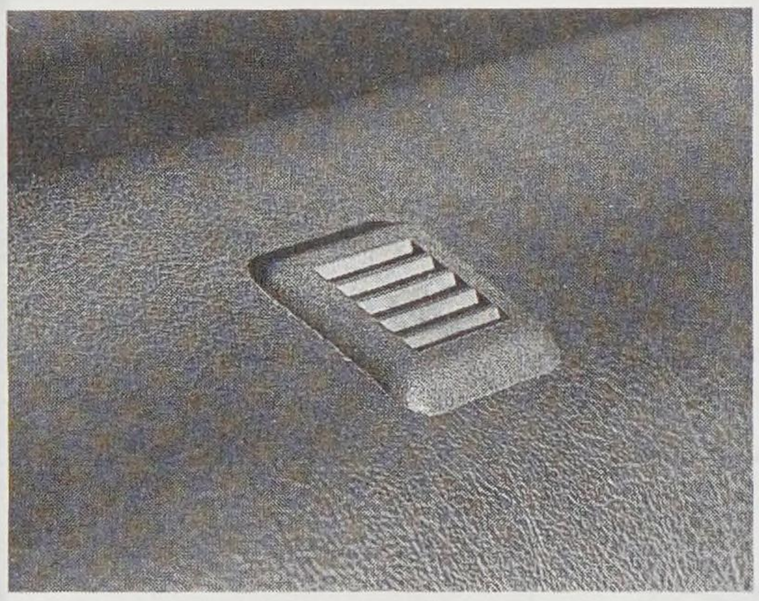
3 Remove the securing screws and pull out the motor and fan assembly.

Temperature probe

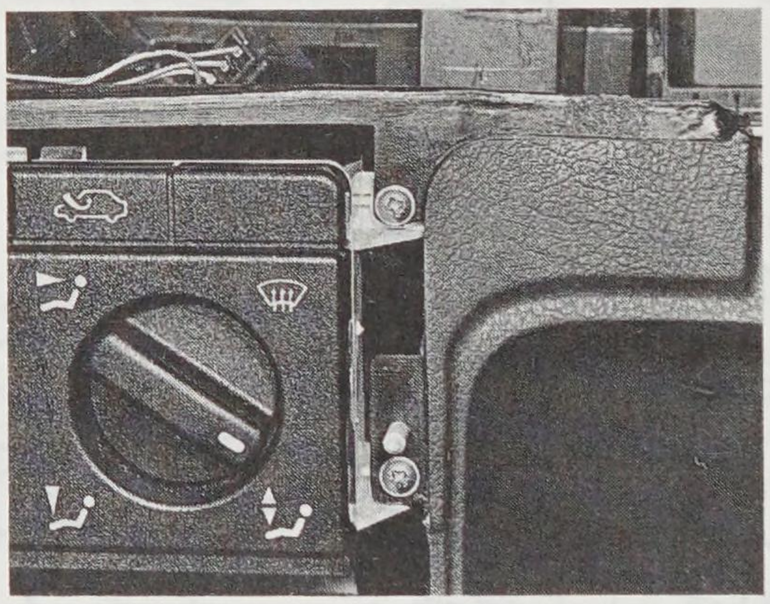
4 Remove the blower motor.
5 Pull the probe from its housing and disconnect the cable (photo).

Heater and matrix assembly

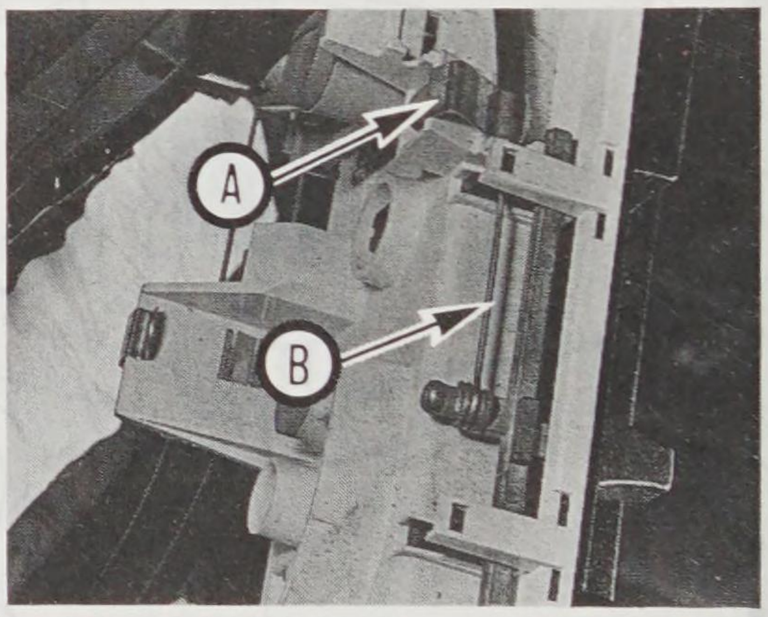
6 Remove the facia panel as described in Section 38.
7 Drain the cooling system or clamp the heater hoses as close as



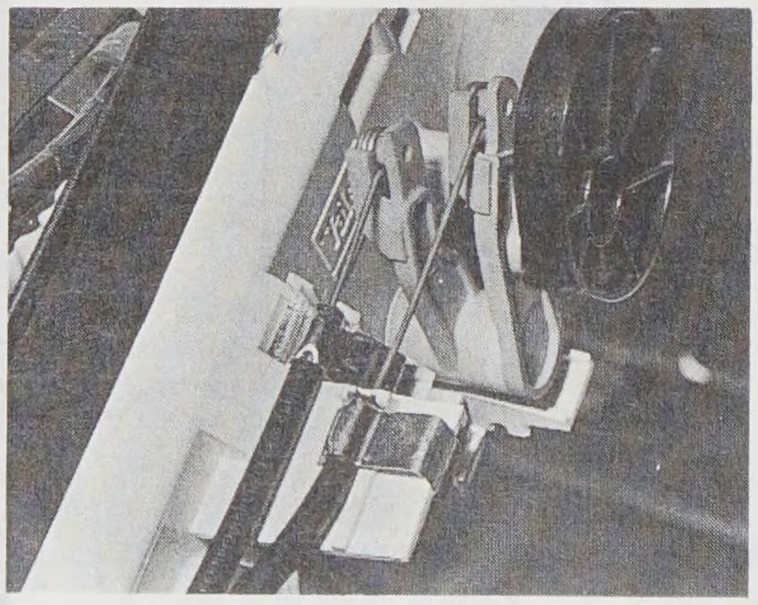
52.8 Interior heat sensor grille on electronically controlled heating system



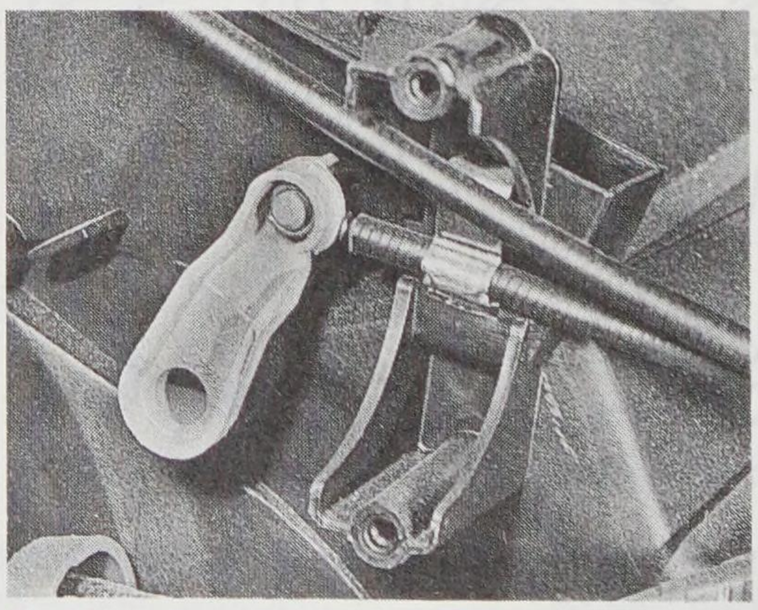
53.7 Heater control panel securing screws



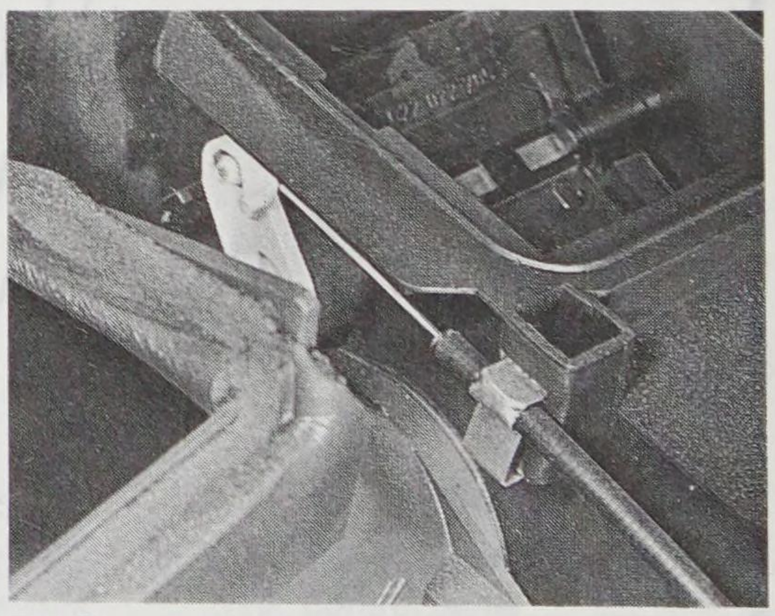
54.2 Fresh air slider cable clip (A) and cable (B)



54.3 Rotary heater control cables



54.4A Heater cable connections at ...



54.4B ... control flap ends

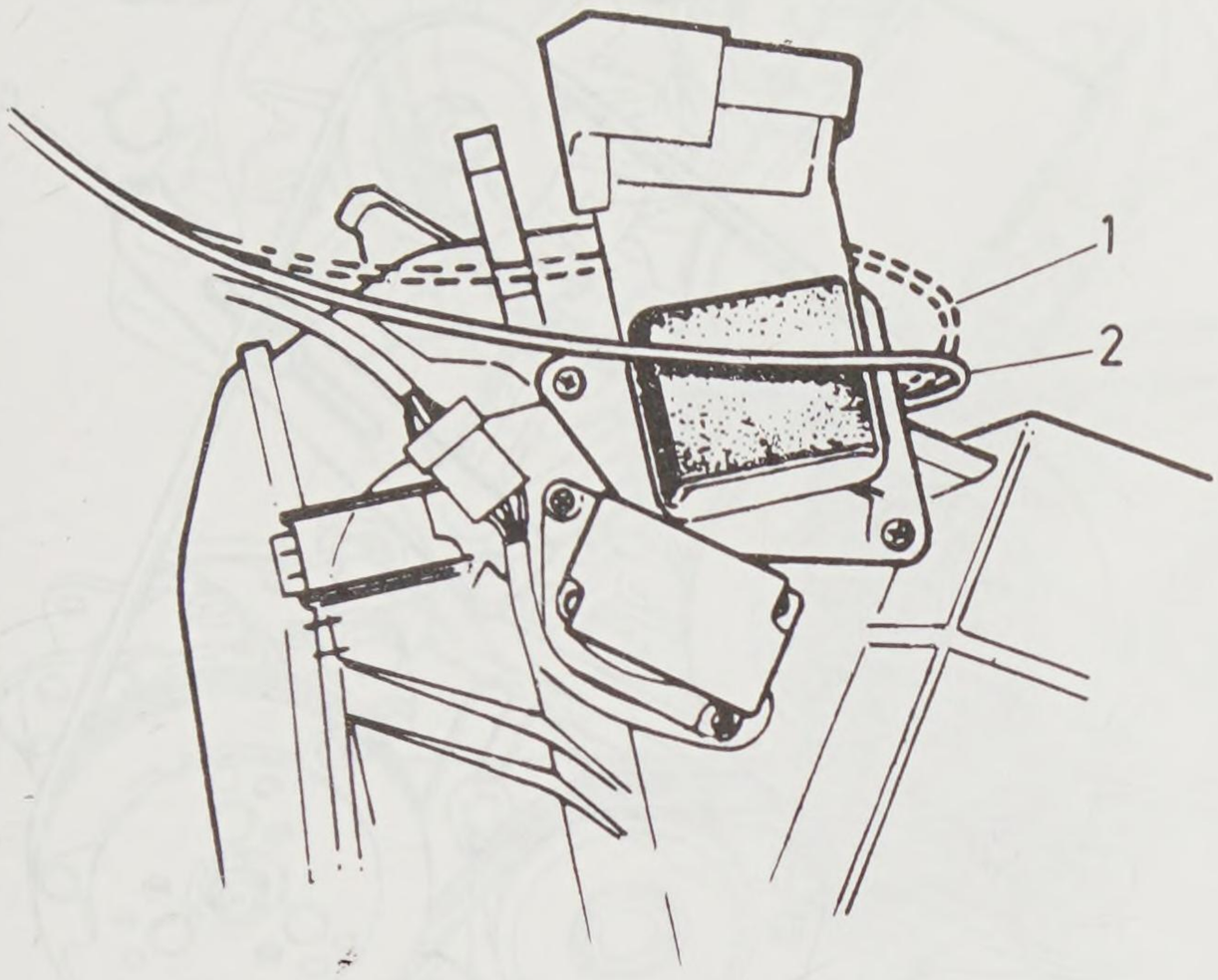


Fig 11.24 Routing of air inlet flap cable (Sec 54)

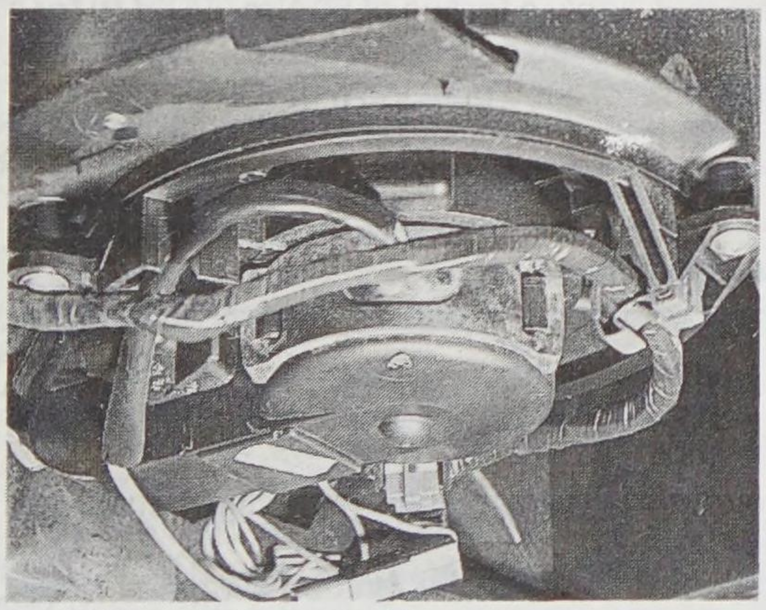
1 Air outlet duct *2 Cable*

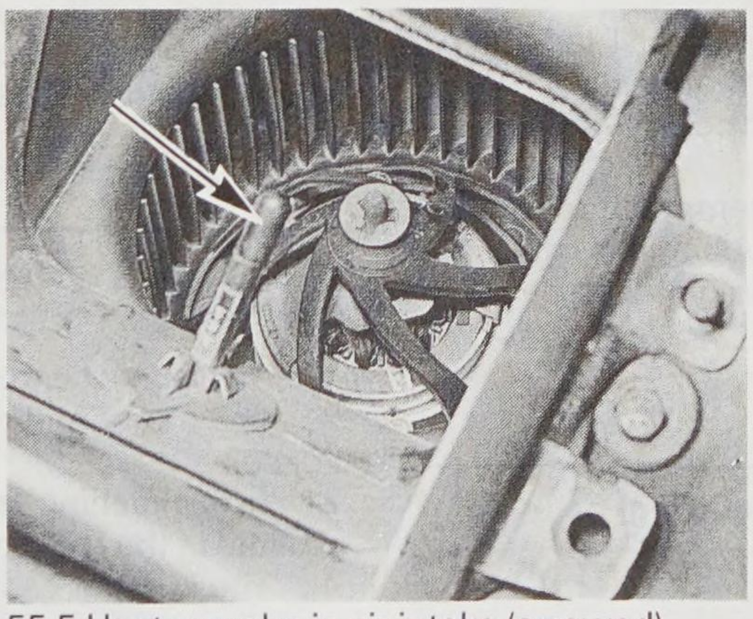
possible to the matrix pipes where they enter the bulkhead in the engine bay (photo).
8 Disconnect the hoses, making a note of which way they are connected.
9 Unbolt and remove the plastic covers from the air intake in the scuttle and the windscreen wiper motor.
10 Remove the bolts securing the heater to the scuttle.
11 Remove the air ducts from each side of the centre floor console.
12 Position a tray under the heater unit to catch any spillage, then undo the bolt from the matrix pipe union block (photo).
13 Remove the securing screw from the lower right-hand side of the heater (photo).
14 Disconnect the electrical connections to the heater and unclip the leads.
15 Pull the heater assembly outward off the matrix union block and manoeuvre it from the vehicle. If it appears stuck, check that all securing bolts/screws have been removed.
16 To remove the matrix from the heater, undo the matrix retaining screws and withdraw the matrix.
17 To remove the air distribution flap actuator (photo), remove its retaining screws and withdraw it from the housing. Note the locating lugs on the drive spindle.
18 Refitting of the blower motor, temperature probe and heater are a reversal of removal noting the following:

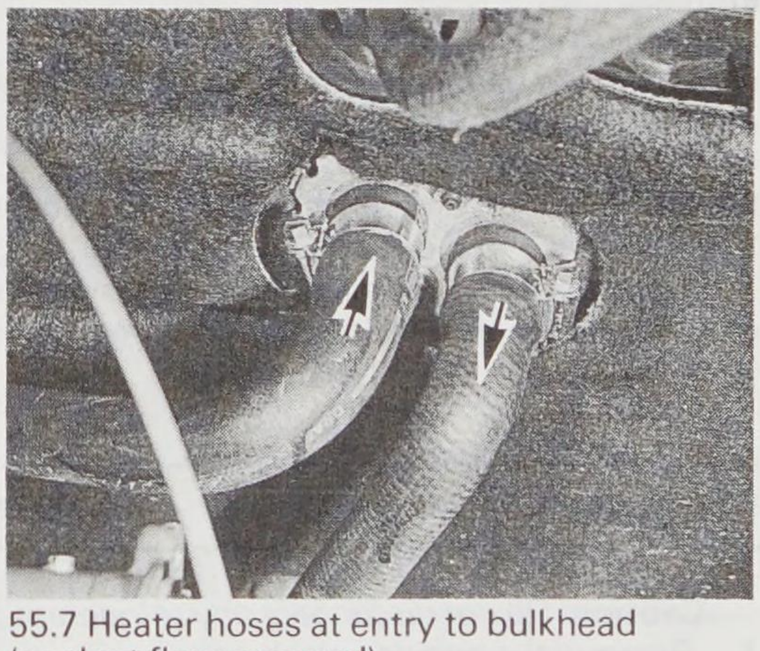
(a) The control cables, if disconnected, must be reconnected in the correct order (see Section 54)
(b) Use new O-ring seals on the matrix pipe unions
(c) The inlet flap operating cable must be routed around the outside of the right-hand air inlet duct
(d) Fill and bleed the cooling system on completion (Chapter 2)

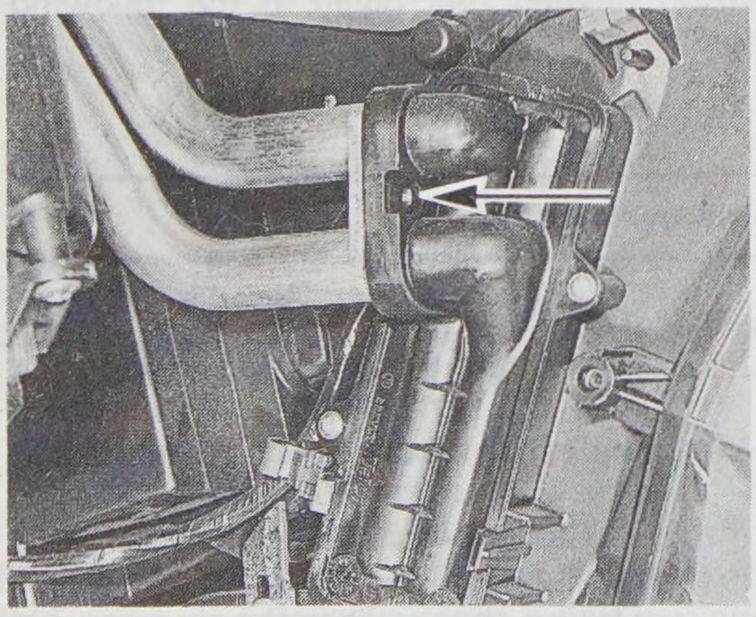
56 Air conditioning system – description and precautions

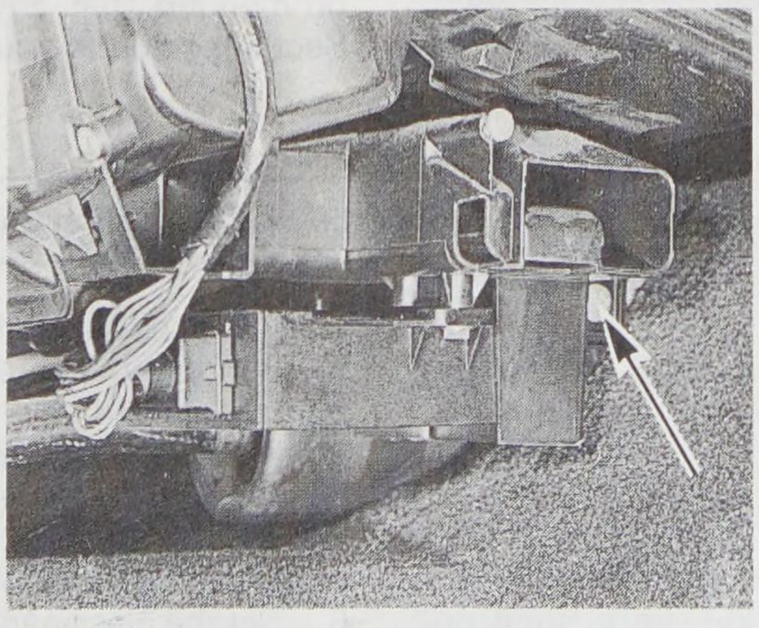
1 Air conditioning is optionally available on some models. In conjunction with the heater the system enables any reasonable air temperature to be achieved inside the car, it also reduces the humidity of the incoming air, aiding demisting even when cooling is not required.
2 The refrigeration side of the air conditioning system functions in a similar way to a domestic refrigerator. A compressor, belt-driven from the crankshaft pulley, draws refrigerant in its gaseous phase from an

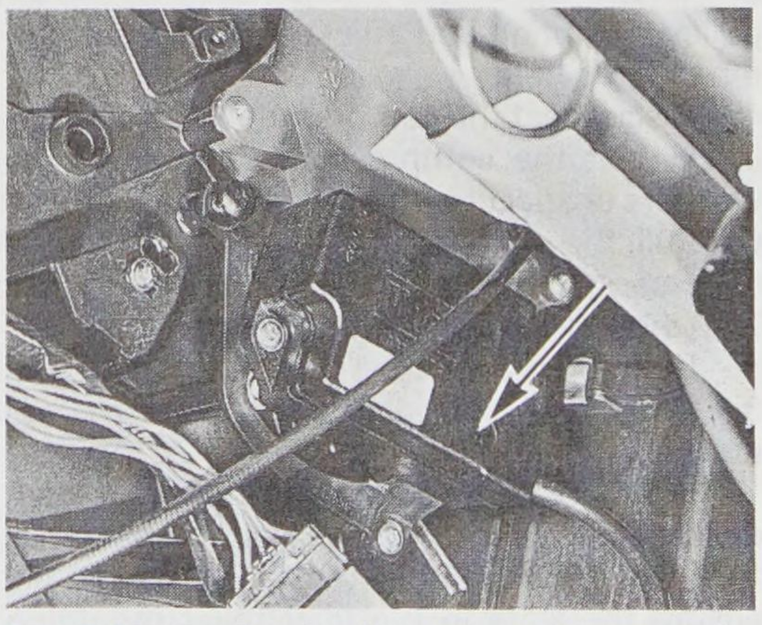

55.2 View of the rear of heater motor


55.5 Heater probe in air intake (arrowed)


55.7 Heater hoses at entry to bulkhead (coolant flow arrowed)


55.12 Matrix pipe union block screw (arrowed)


55.13 Heater lower right-hand securing screw (arrowed)


55.17 Air distribution flap actuator (arrowed)

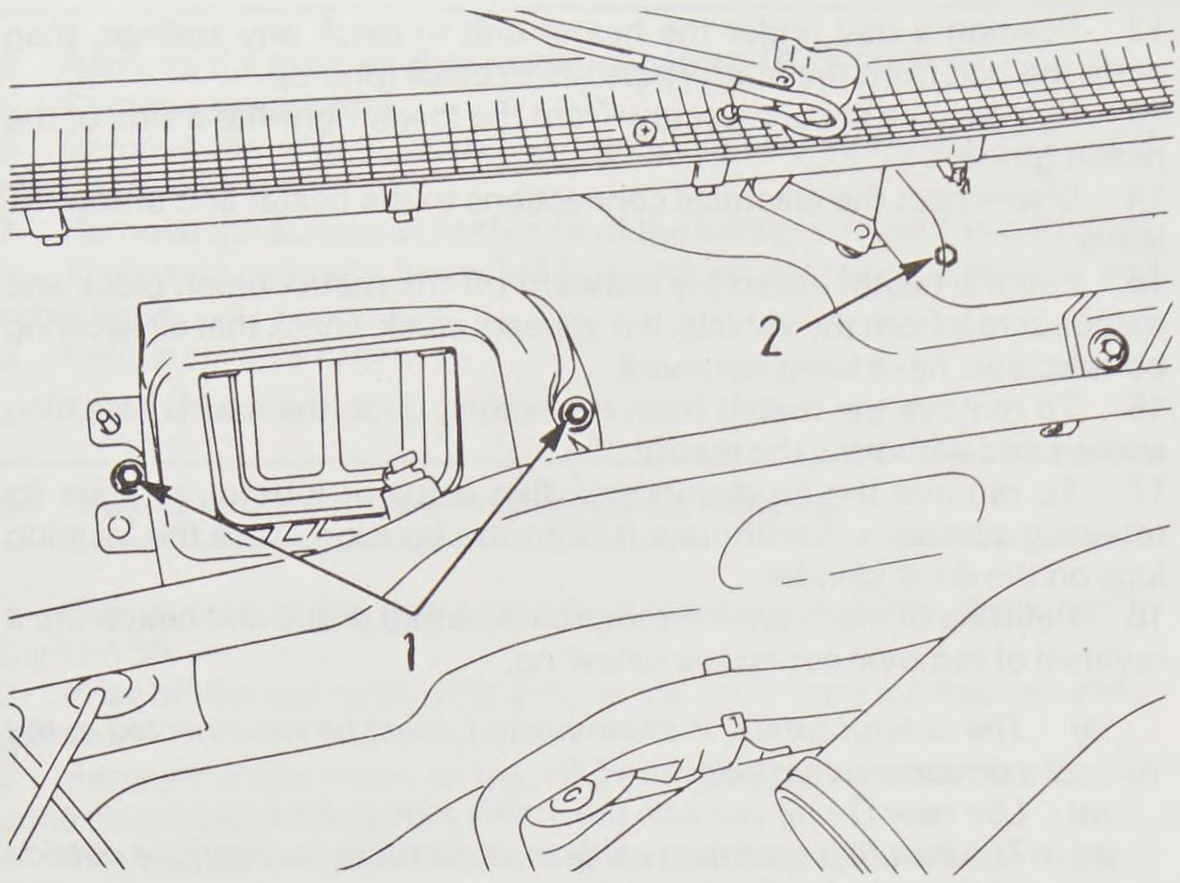


Fig 11.25 Plastic cover securing bolts (1) and heater bolt (2) in scuttle (Sec 55)

evaporator. The compressed refrigerant passes through a condenser where it loses heat and enters its liquid phase. After dehydration the refrigerant returns to the evaporator where it absorbs heat from air passing over the evaporator fins. The refrigerant becomes a gas again and the cycle is repeated.

3 Various subsidiary controls and sensors protect the system against excessive temperature and pressures. Additionally, engine idle speed is increased when the system is in use to compensate for the additional load imposed by the compressor.

Precautions

4 Although the refrigerant is not itself toxic, in the presence of a naked flame (or a lighted cigarette) it forms a highly toxic gas. Liquid refrigerant spilled on the skin will cause frostbite. If refrigerant enters the eyes, rinse them with a dilute solution of boric acid and seek medical advice immediately.

5 In view of the above points, and of the need for specialised equipment for evacuating and recharging the system, any work which requires the disconnection of a refrigerant line must be left to a specialist.

6 Do not allow refrigerant lines to be exposed to temperatures above 230°F (110°C) – eg during welding or paint drying operations.

7 Do not operate the air conditioning system if it is known to be short of refrigerant, or further damage may result.

57 Air conditioning compressor – removal and refitting

Caution: *Do not disconnect any refrigerant pipelines.*

1 Remove the engine splash panels.

2 Where the compressor is driven by the alternator belt, remove the alternator belt as described in Chapter 12, Section 6.

3 Where the belt is independent of the alternator, loosen the idler pulley mounting and adjuster bolts, push the compressor inward and remove the belt.

4 Disconnect the compressor electrical connector.

5 Unbolt the compressor mountings, noting the positions of any washers or spacers, and the earth lead.

6 Pull the compressor to one side and tie it out of the way. If necessary, disconnect any hose support clips or cable ties.

7 Unbolt and remove the idler roller.

8 Refitting is a reversal of removal, noting the following.

9 When fitting the idler roller, ensure the adjustment slots are pushed up against the bolt heads.

10 On types incorporating the alternator belt, tension the drive belt as described in Chapter 12, Section 2 (Fig. 11.26).

11 Where the belt is tensioned by the alternator adjustment bolt, ensure the slots in the idler roller mounting bracket are pushed up against the bolts. Tension the belt as described in Chapter 12, Section 2.

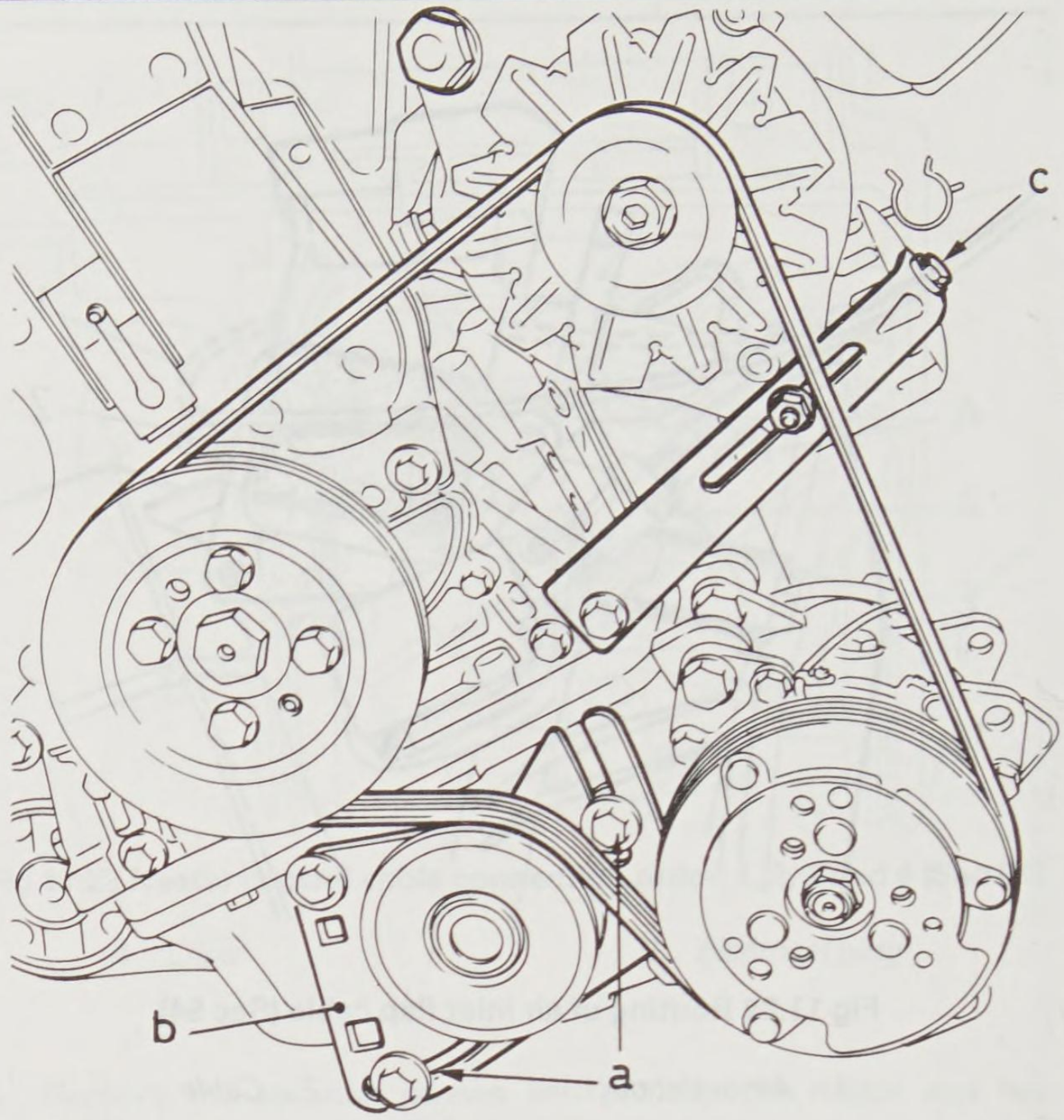


Fig 11.26 Air conditioning compressor drivebelt arrangement with alternator (Sec 57)

a Idler roller adjustment slots
b Idler roller mounting bracket
c Alternator adjustment bolt

12 Where the belt is independent of the alternator, loosen the idler roller mounting bolts and, using a torque wrench in the lower of the square holes in the roller bracket, apply a torque of 60 Nm (44 lbf ft) for a new belt and 55 Nm (40 lbf ft) for a used belt to the bracket. Tighten the bolts with the bracket held in the torqued position (Fig. 11.27).

58 Sunroof – general description

1 An electric sunroof is available on most models.

2 The motor and relay are housed in the roof space behind the roof console.

3 A declutching lever and emergency manual winding handle are stowed in the roof console.

4 The sunroof can be operated without the ignition switched on by opening a front door. A current supply is taken through the door microswitches.

5 Because of the many problems of leaks, wind noise and rattles which can be encountered from a badly fitted sunroof, it is recommended that any servicing beyond that given in the following Sections is left to your dealer.

59 Glass sliding panel – removal and refitting

1 Close the sunroof then disconnect the battery.

2 Remove the screws securing the frame to the glass and slide the frame rearward.

3 Remove the screws from the side frames, disengage the glass and lift it upward from the frame.

4 Before refitting, check the runners are correctly located in the guide fingers and that the seal is in good condition.

5 Set the glass panel in the roof frame, then slacken the six screws in the side rails.

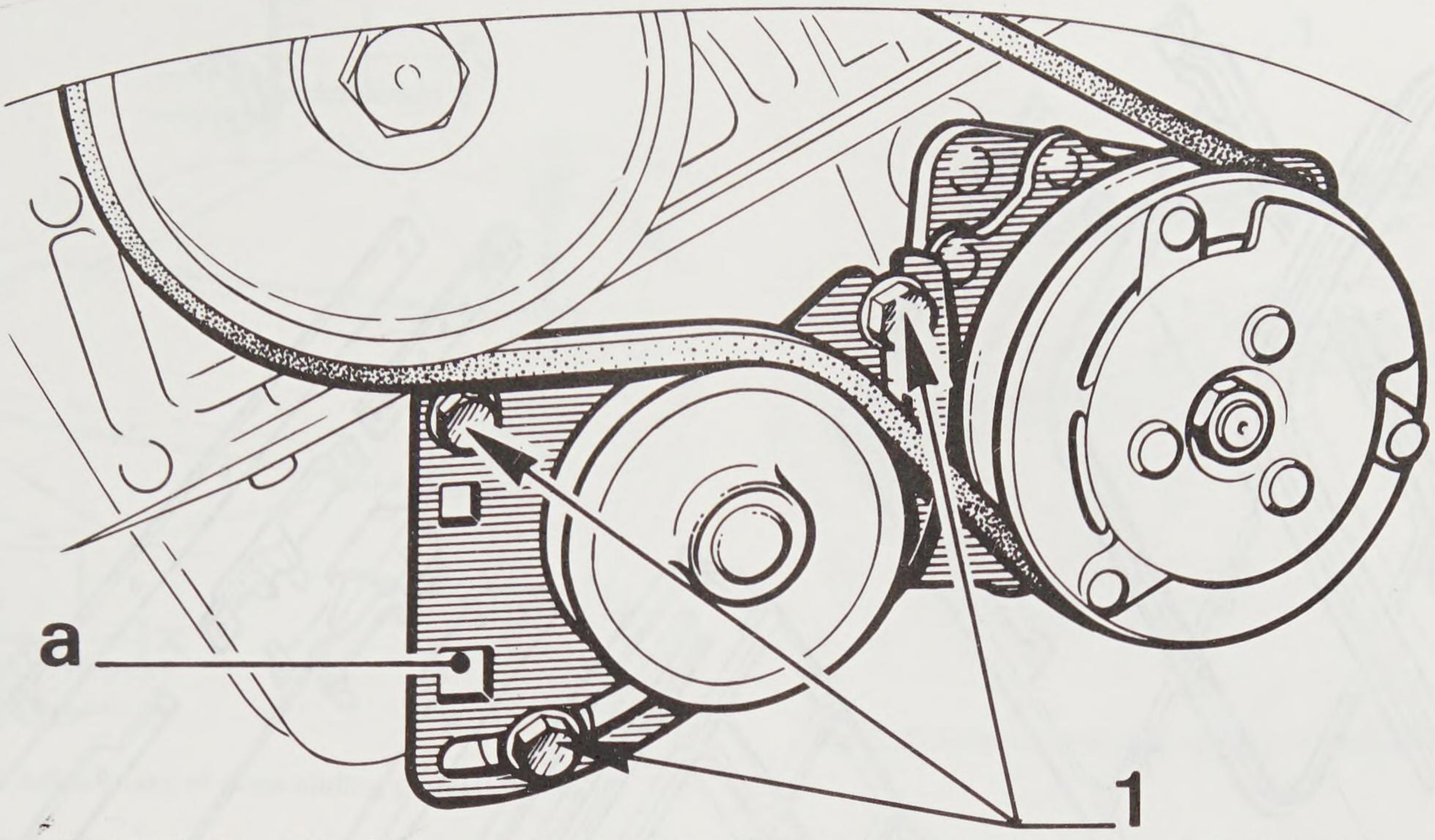


Fig 11.27 Air conditioning compressor drivebelt arrangement independent of alternator (Sec 57)

1 Idler roller mounting bolts
a Torque wrench cut-out

6 Adjust the glass panel height (see Fig. 11.29) and tighten the screws.
7 The remaining procedure is a reversal of removal.
8 Horizontal centralisation of the glass panel in the runners is automatic.

60 Sunroof motor/gear assembly – removal and refitting

1 Remove the roof console.
2 Declutch the motor using the release lever which is stowed in the roof console. Engage the lever in the clutch, turn it through 90°, then remove the lever.
3 Disconnect the motor electrical leads.
4 Remove the screws securing the motor/gear assembly and withdraw the unit from the roof.
5 Before refitting the assembly, line up the index marks as shown in Fig. 11.30. This can be done by declutching and removing the motor, then using the emergency winding handle to turn the cams so that when the clutch is engaged the marks line up. The microswitch must be located in the cut-out in the cam.
6 Refit the motor/gear assembly in reverse order to removal.

61 Sunroof blind – removal and refitting

1 Remove the glass sliding panel (Section 59).
2 Remove the screws from the glass panel front slider.
3 Remove the three front screws from the side rails.
4 Withdraw the blind upward detaching it from the front first then lifting the sliding frame at the rear to disengage the rear stops on the blind.
5 Refit in reverse order.

62 Sunroof cables and runners – renewal

Note: *The cables and runners on both sides of the sunroof must be renewed at the same time.*

1 Remove the sliding glass panel (Section 59).
2 Remove the motor and gear assembly (Section 60).
3 Remove the slide/slipper assembly from each side rail (Fig. 11.31).
4 Slide the runner to the rear and remove the three screws from the guide finger then withdraw the finger plate (Fig. 11.32).
5 Withdraw the cable and runner assembly (Fig. 11.33).
6 Refit in reverse order, greasing the cables with petroleum jelly and the runners with Redex (Peugeot part number 9734.76) and ensure the guide fingers are correctly located on the runners.

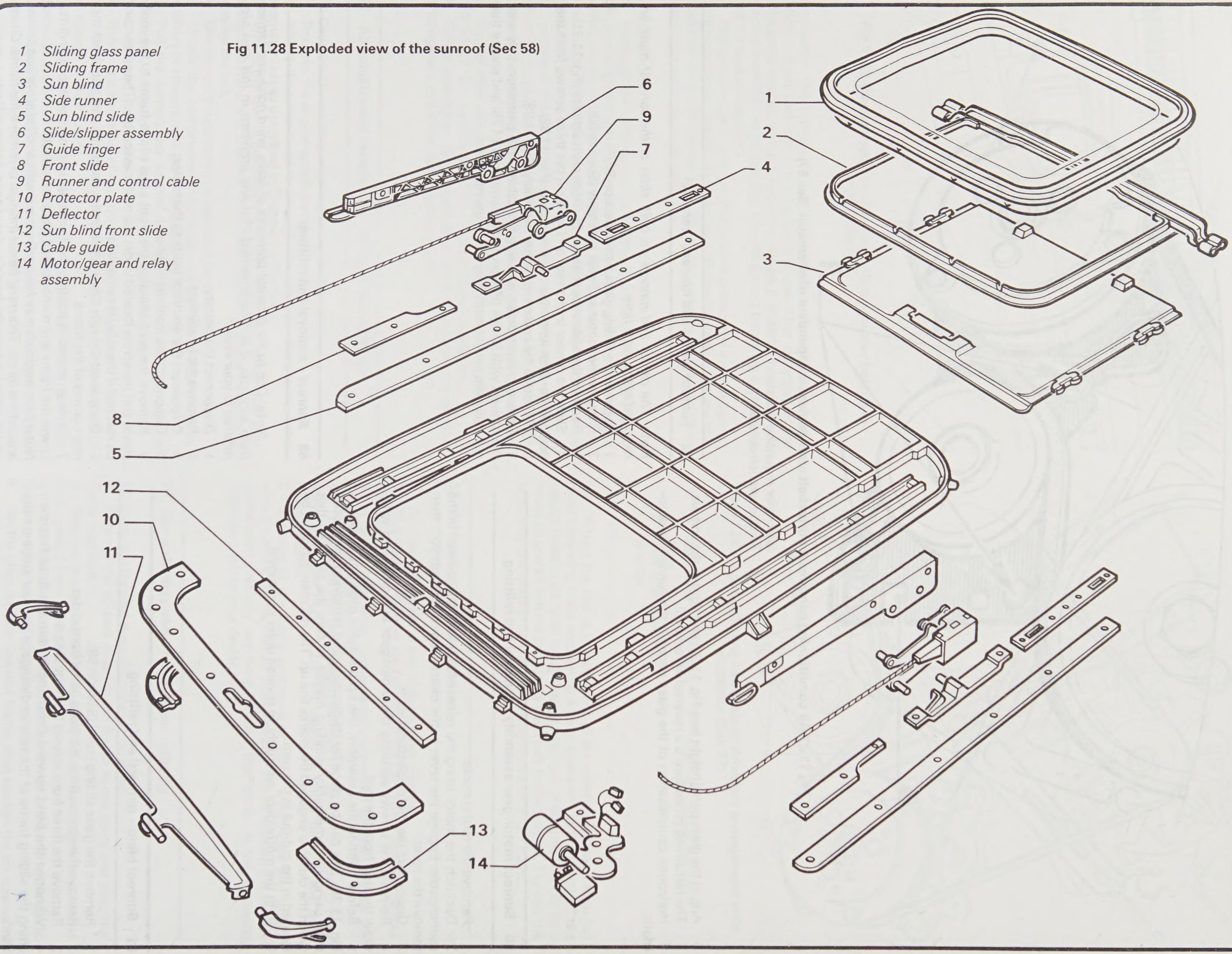
63 Sunroof – removal and refitting

Note: *Due to the inherent problems of leaks, wind noise and rattles from sunroofs, it is recommended that any problems in this area are referred to your dealer.*

1 Disconnect the battery.
2 Remove the headlining.
3 Disconnect the electrical leads to the motor.
4 Disconnect the front drain tubes.
5 Remove the nuts securing the front edge of the frame to the roof panel, and the screw located under the motor assembly. (The screw can be reached if the relay is removed.)
6 Disconnect the rear drain tubes and remove the two nuts from the rear corners of the frame.
7 With an assistant holding the frame up, remove the two side nuts. Lower the frame and manoeuvre it from the vehicle.
Note: *Later sunroofs may have adhesive mastic applied at various points around the frame. This must be cut through to remove the frame. Clean all old adhesive from the frame and roof panel before refitting.*

1 *Sliding glass panel*
2 *Sliding frame*
3 *Sun blind*
4 *Side runner*
5 *Sun blind slide*
6 *Slide/slipper assembly*
7 *Guide finger*
8 *Front slide*
9 *Runner and control cable*
10 *Protector plate*
11 *Deflector*
12 *Sun blind front slide*
13 *Cable guide*
14 *Motor/gear and relay assembly*

Fig 11.28 Exploded view of the sunroof (Sec 58)



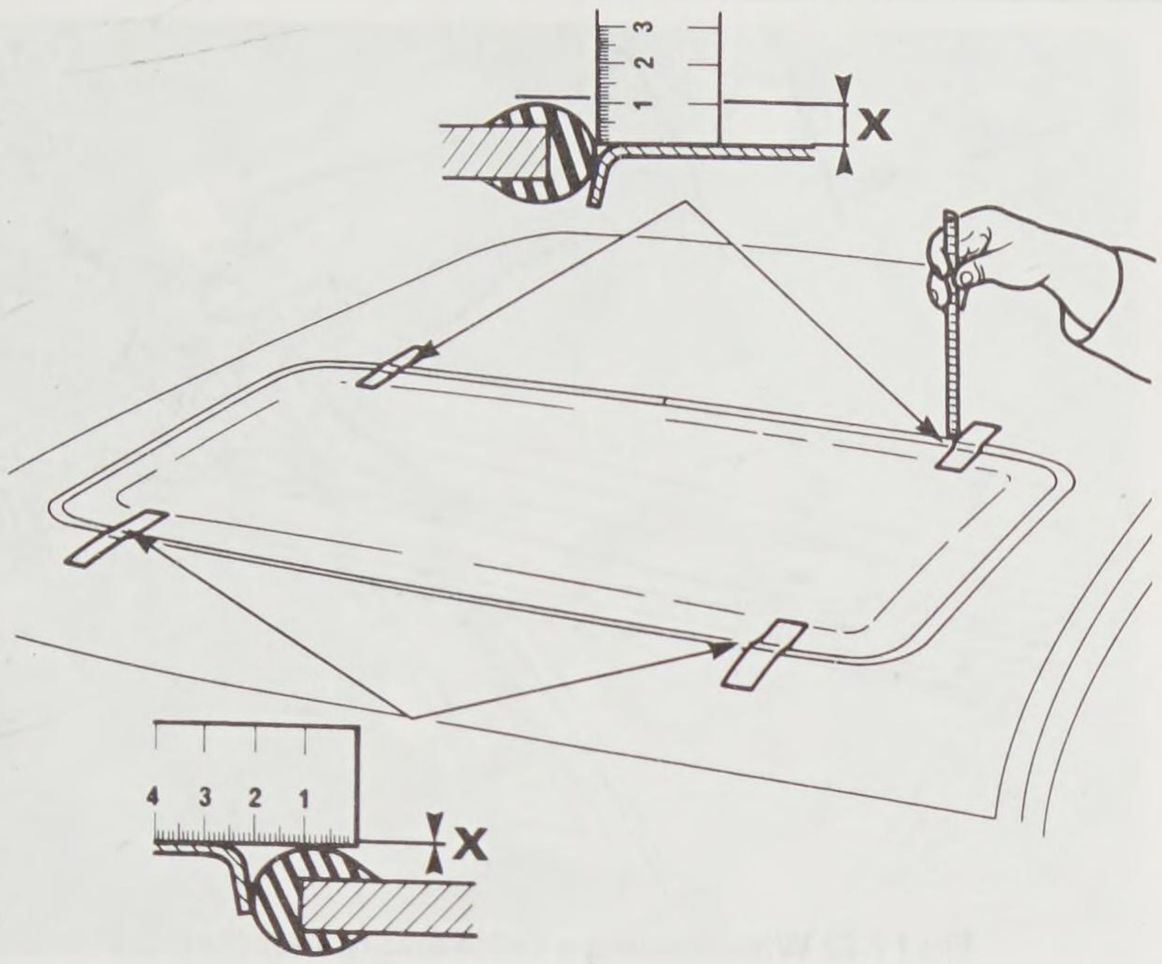


Fig 11.29 Adjustment of glass sliding panel (Sec 59)

X = (front) 0 to 1.0 mm *X = (rear) 1.0 to 2.0 mm*

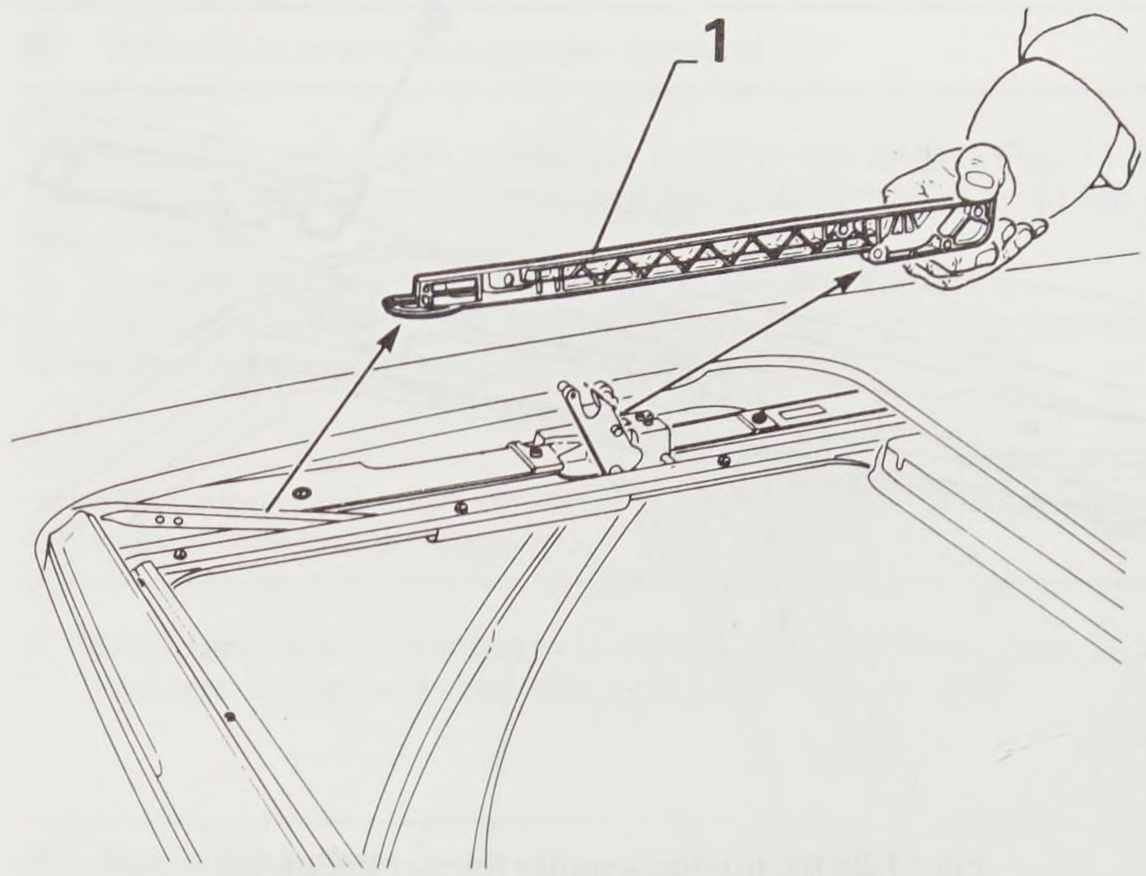


Fig 11.31 Removing a slide/slipper (1) from a side rail (Sec 62)

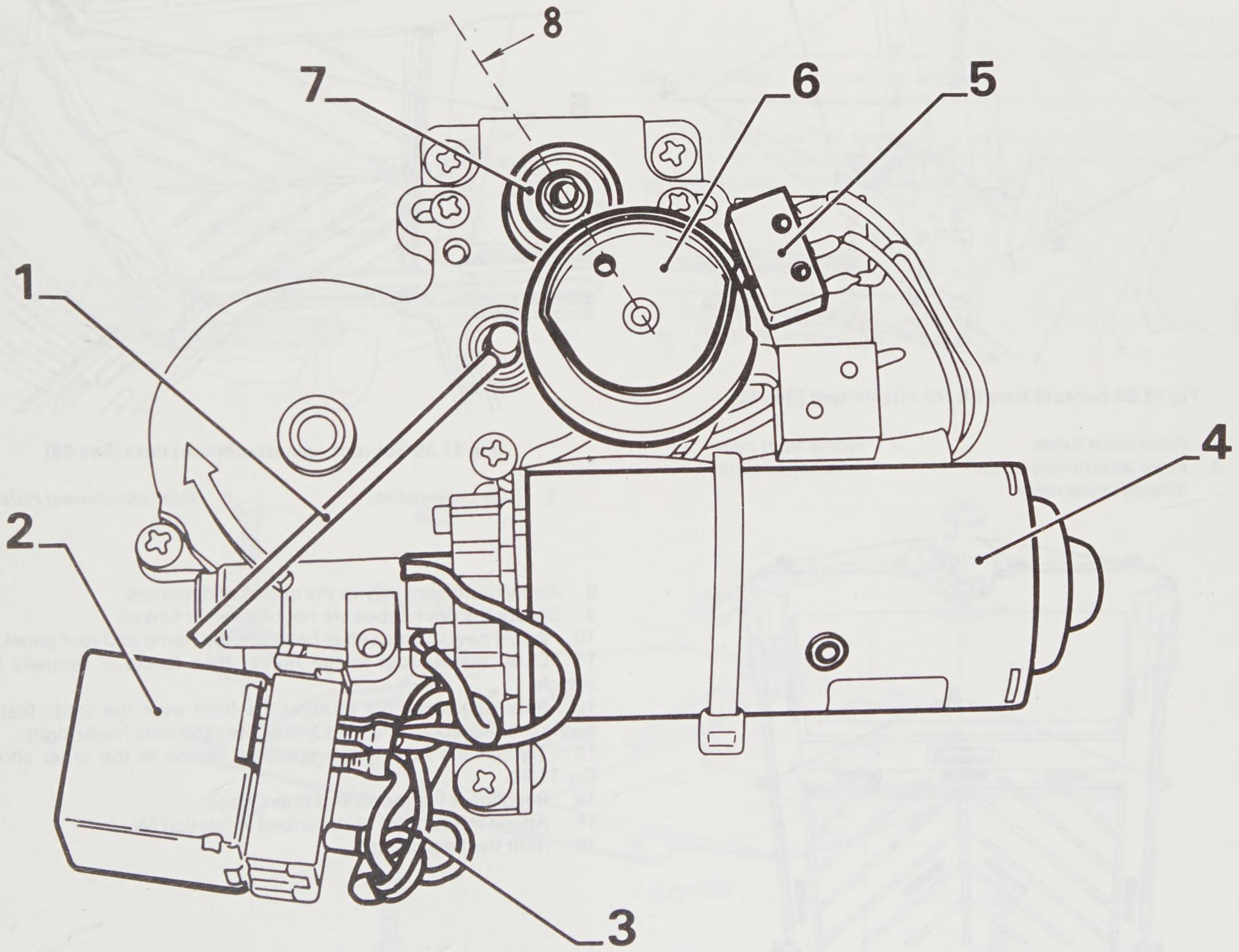


Fig 11.30 Sunroof motor/gear assembly components (Sec 60)

1 *Declutching lever*
2 *Relay*
3 *Electrical connections*
4 *Motor*
5 *Microswitch*
6 *Cam*
7 *Cam*
8 *Index line*

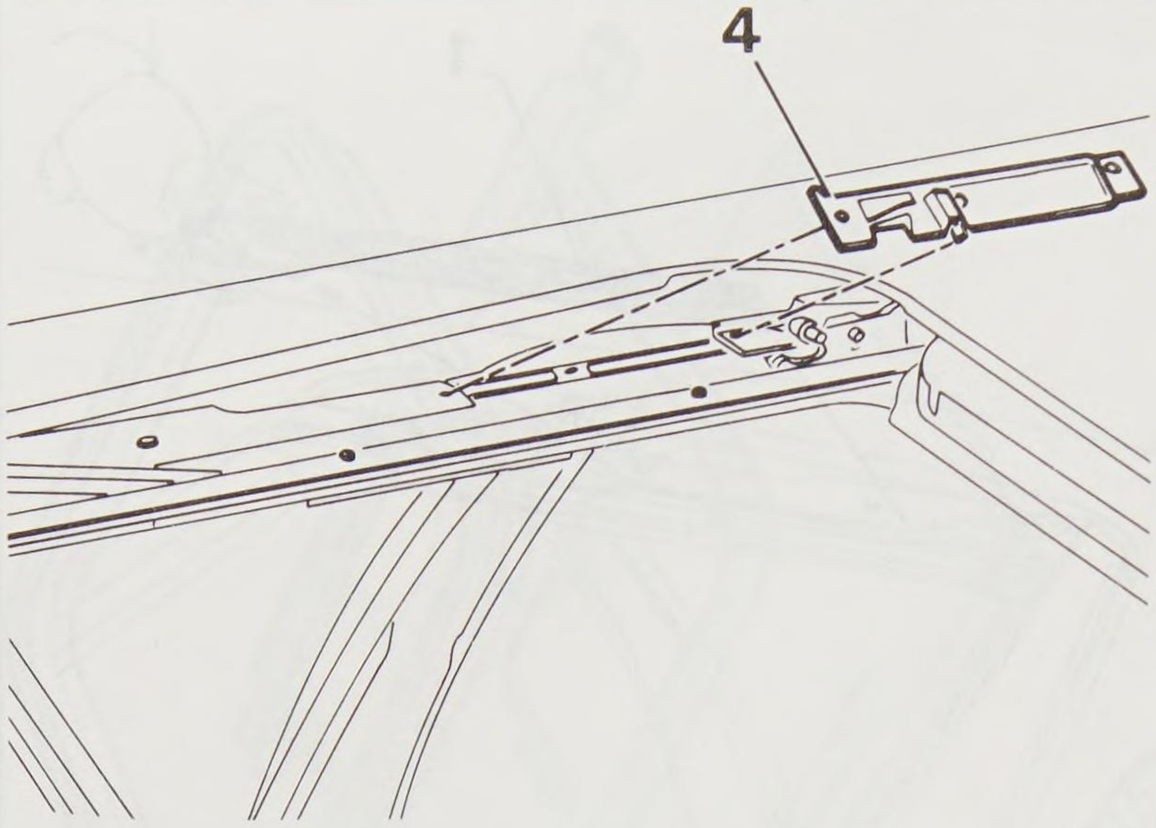


Fig 11.32 Removing a guide finger (4) (Sec 62)

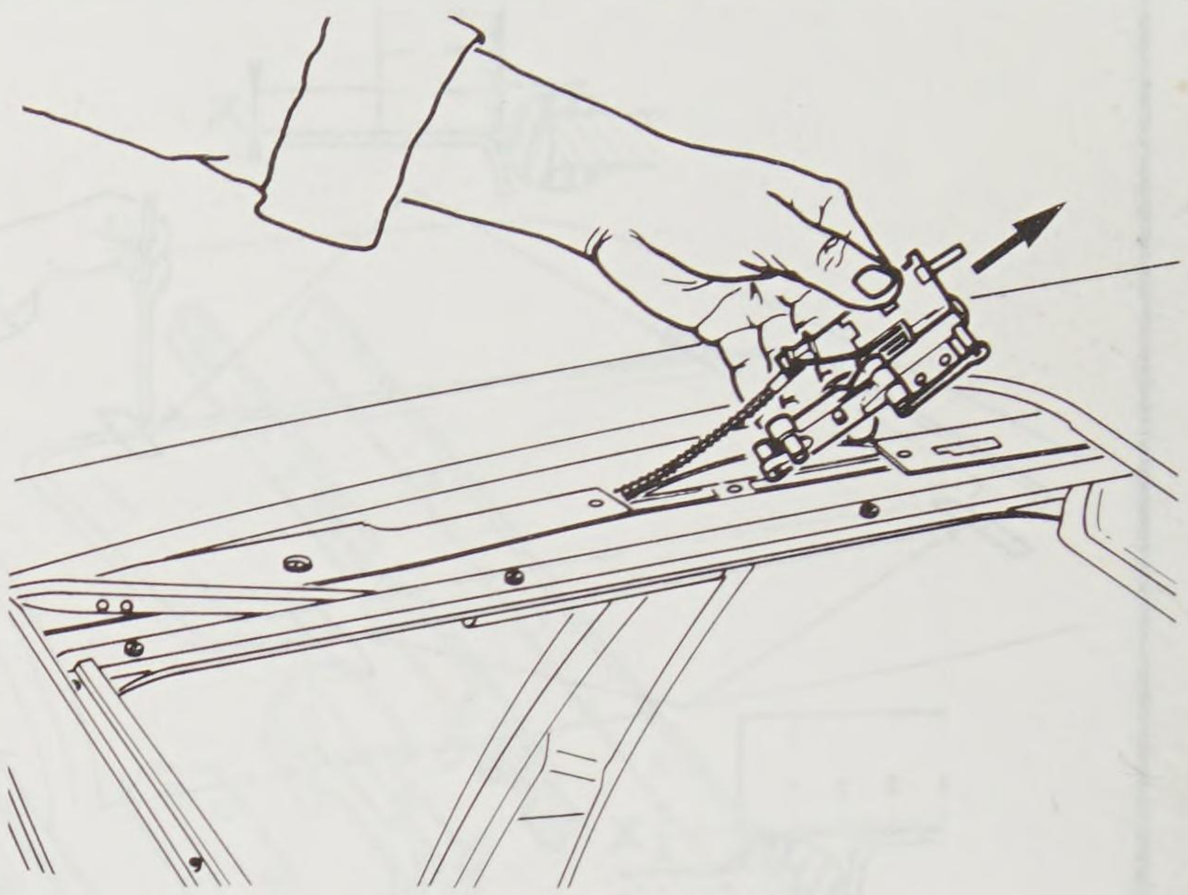


Fig 11.33 Withdrawing a cable and runner (Sec 62)

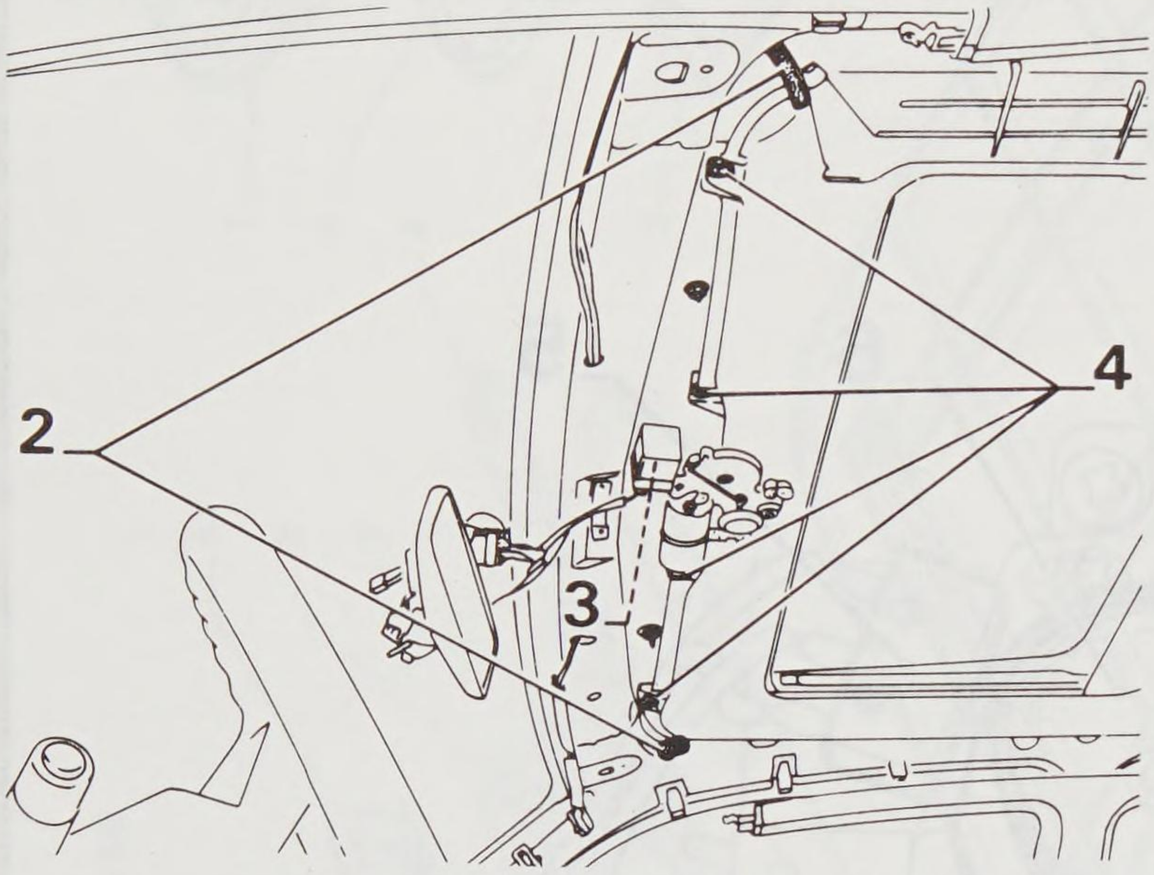


Fig 11.34 Sunroof frame front attachment (Sec 63)

2 Front drain tubes
3 Front attachment screw located under relay
4 Frame front edge attachment nuts

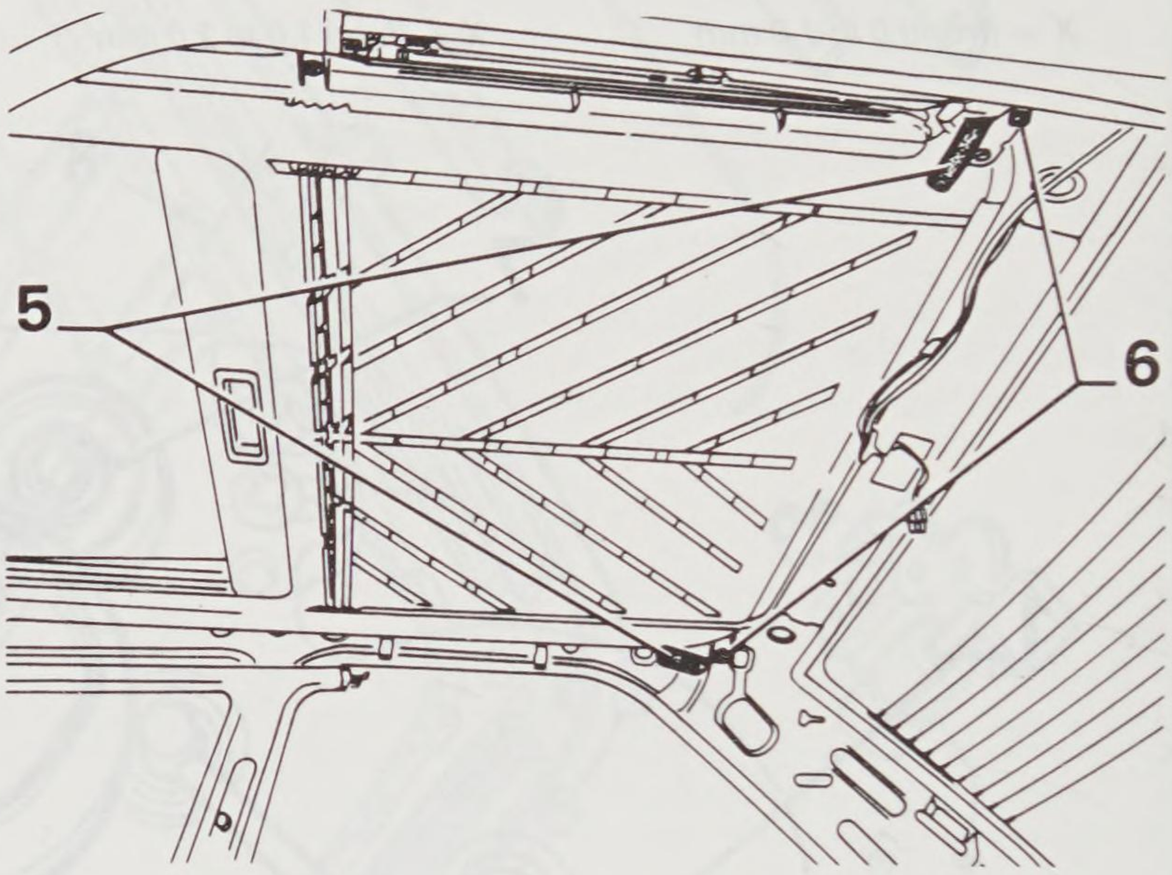


Fig 11.35 Sunroof rear attachment nuts (Sec 63)

5 Rear drain tubes
6 Rear attachment nuts

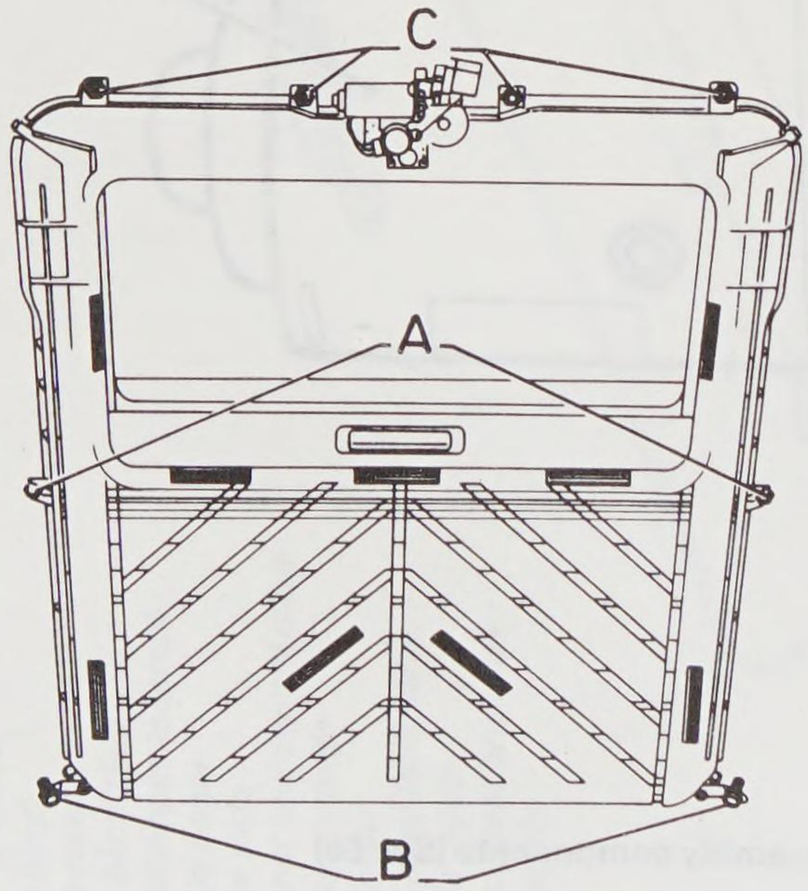


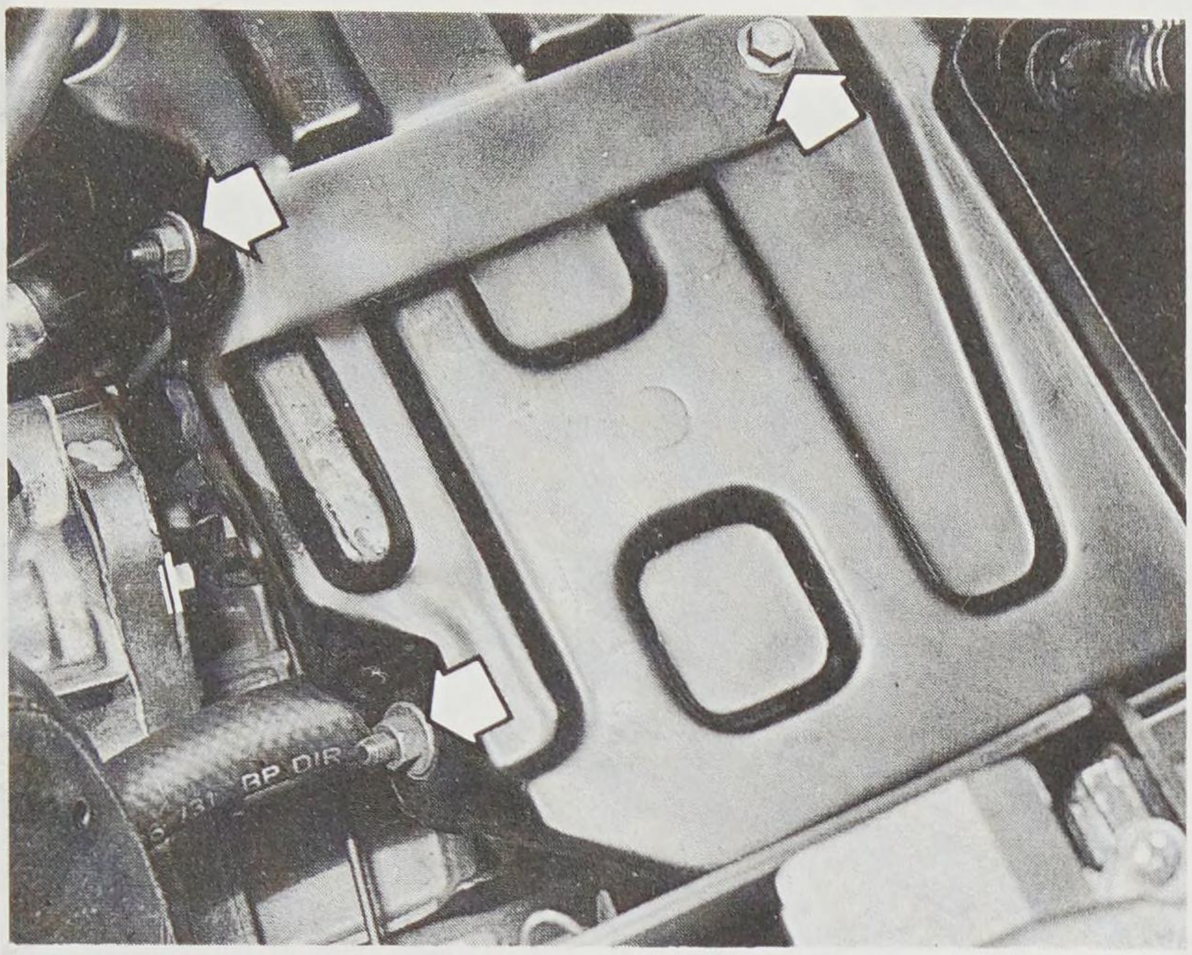
Fig 11.36 Order of tightening sunroof frame securing nuts (Sec 63)

A Side nuts
B Rear nuts
C Front nuts

8 Apply petroleum jelly to the cables and runners.
9 Ensure the drain tubes are not blocked or kinked.
10 Apply new mastic sealer between the frame and roof panel.
11 Close the sunroof in the frame, then locate it centrally in the vehicle.
12 Raise the assembly locating the front over the studs first, then swing the rear edge up and fit and tighten the nuts finger-tight.
13 Tighten the nuts to the specified torque in the order shown in Fig. 11.36.
14 Reconnect the motor and drain tubes.
15 Adjust the sunroof as described in Section 59.
16 Refit the headlining.

64 Battery tray – removal and refitting

1 Remove the battery as described in Chapter 12, Section 4.
2 Remove the three bolts (photo) and lift out the tray.
3 Refit in reverse order.



64.2 Battery tray securing bolts (arrowed)

65 Underfloor protection panels – general

1 Underfloor protection panels are fitted to the engine (Fig. 11.37). The rear underfloor components and the spare wheel (Fig. 11.38) on most models.
2 They are removed by unbolting them from the floorpan.
3 The spare wheel panel is removed by first removing the spare wheel then removing the carrier hinge bolts.

66 Wheel arch liners – general

1 Wheel arch liners are fitted to both front and rear wheel arches.
2 They are clipped and screwed in position – see Fig. 11.39.

67 Rear air extractor duct – removal and refitting

1 Remove the trim panel from the left-hand side of the boot or load space.
2 Remove the bolts securing the duct to the floorpan and remove the duct (photos).
3 Refit in reverse.

68 Mudflaps – removal and refitting

1 The front mudflap is secured by self-tapping screws (photo).
2 The rear mudflap is secured by a nut, and plastic clips which can be removed using a forked tool (photos).

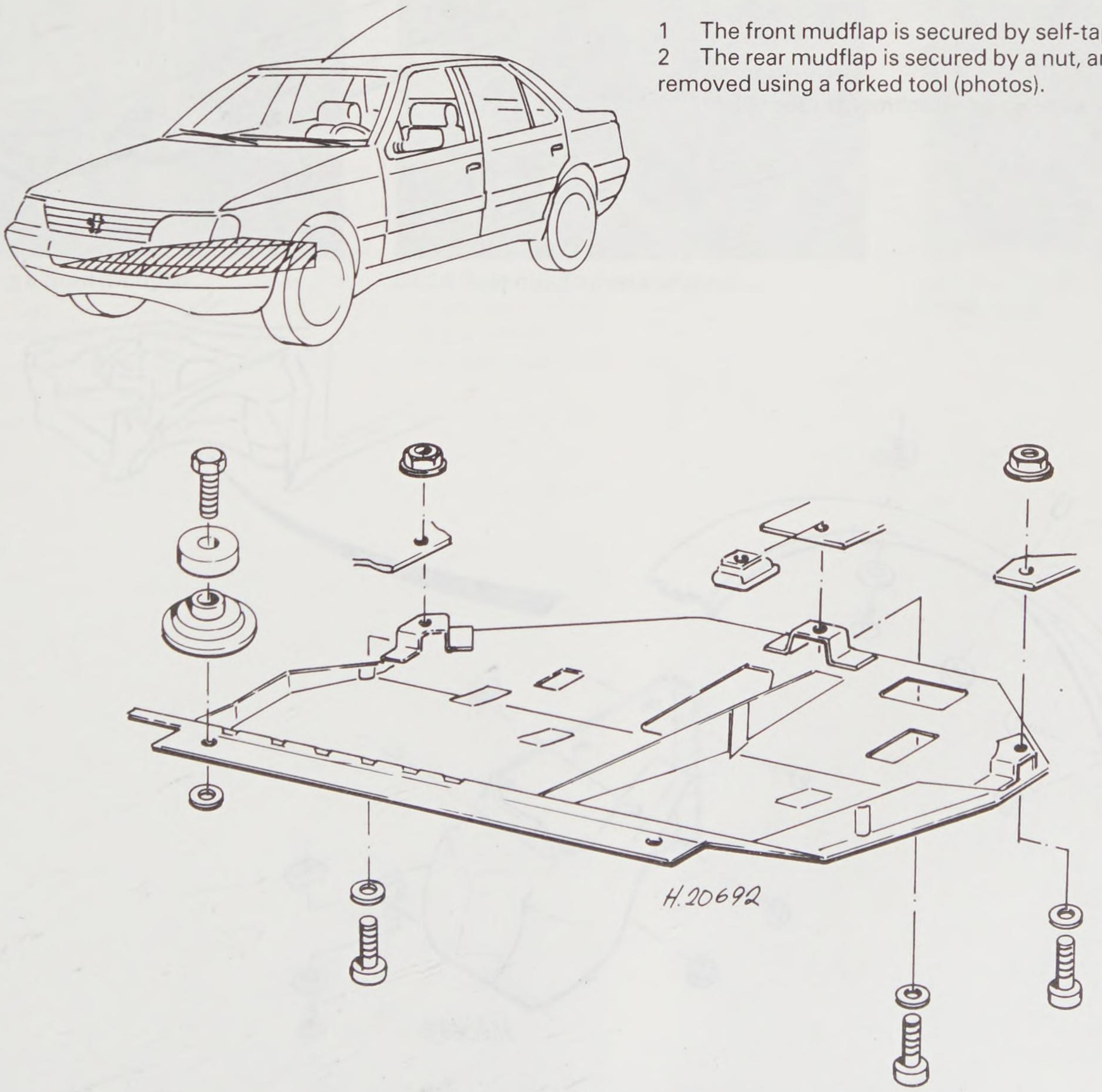


Fig 11.37 Engine underfloor protection panels and attachments (Sec 65)

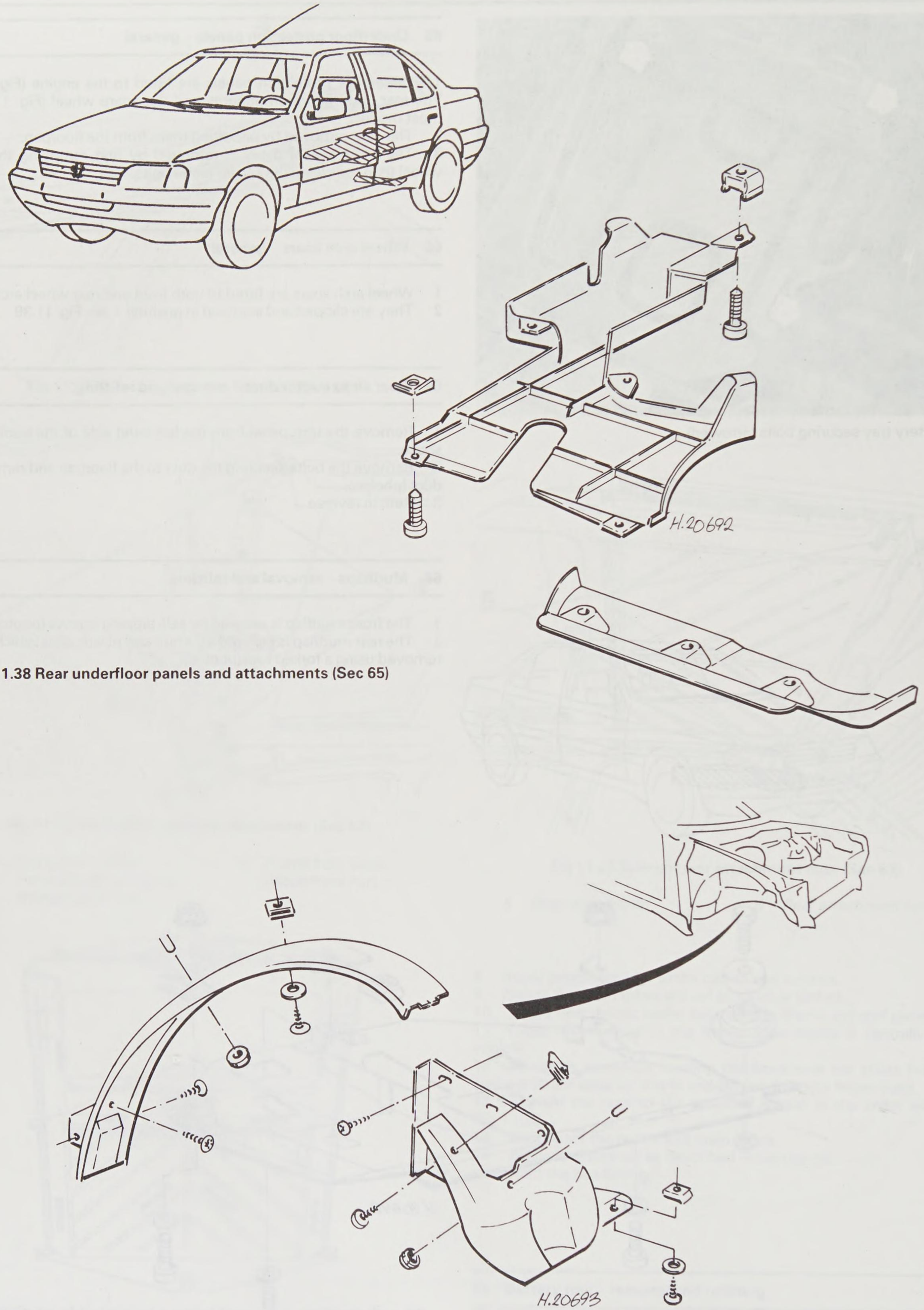
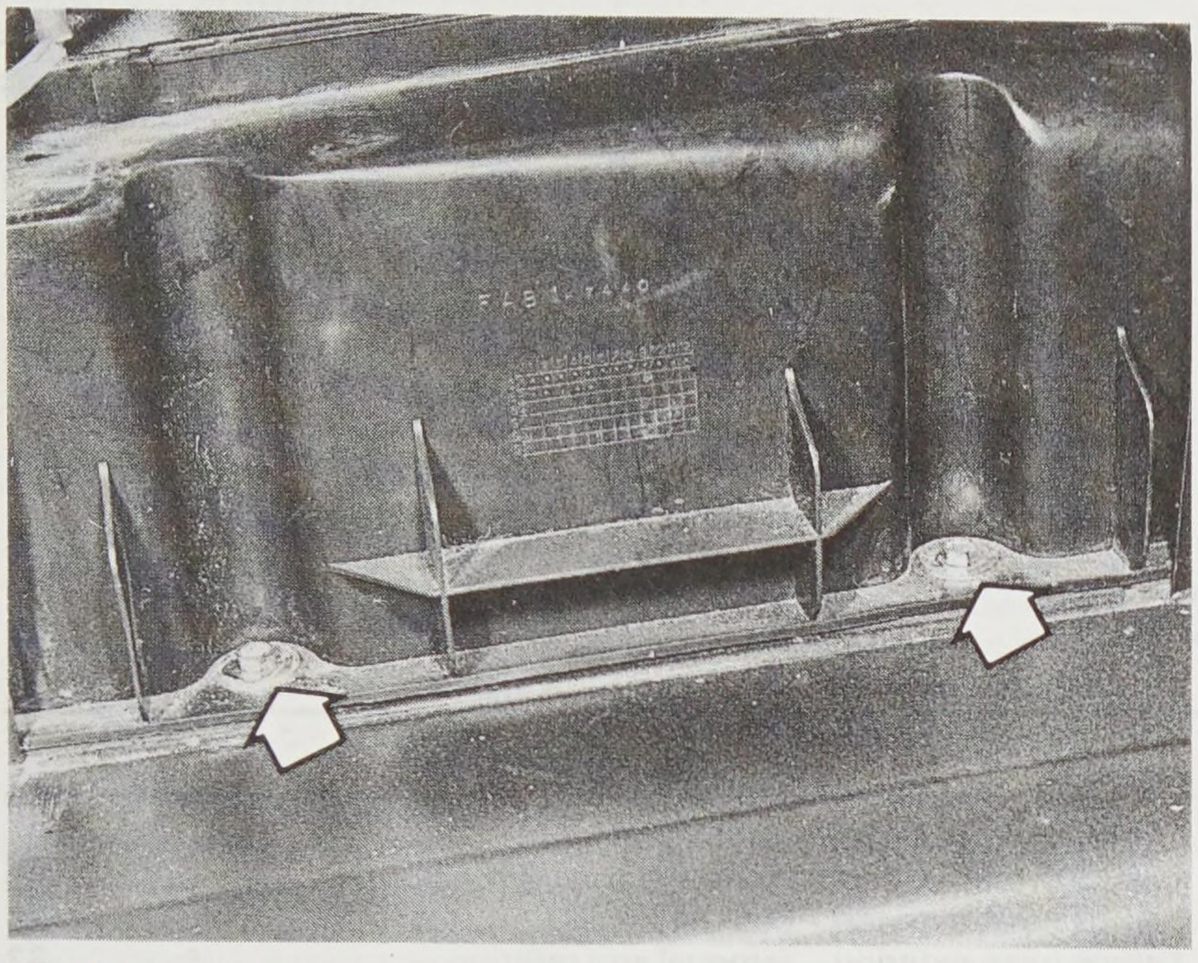
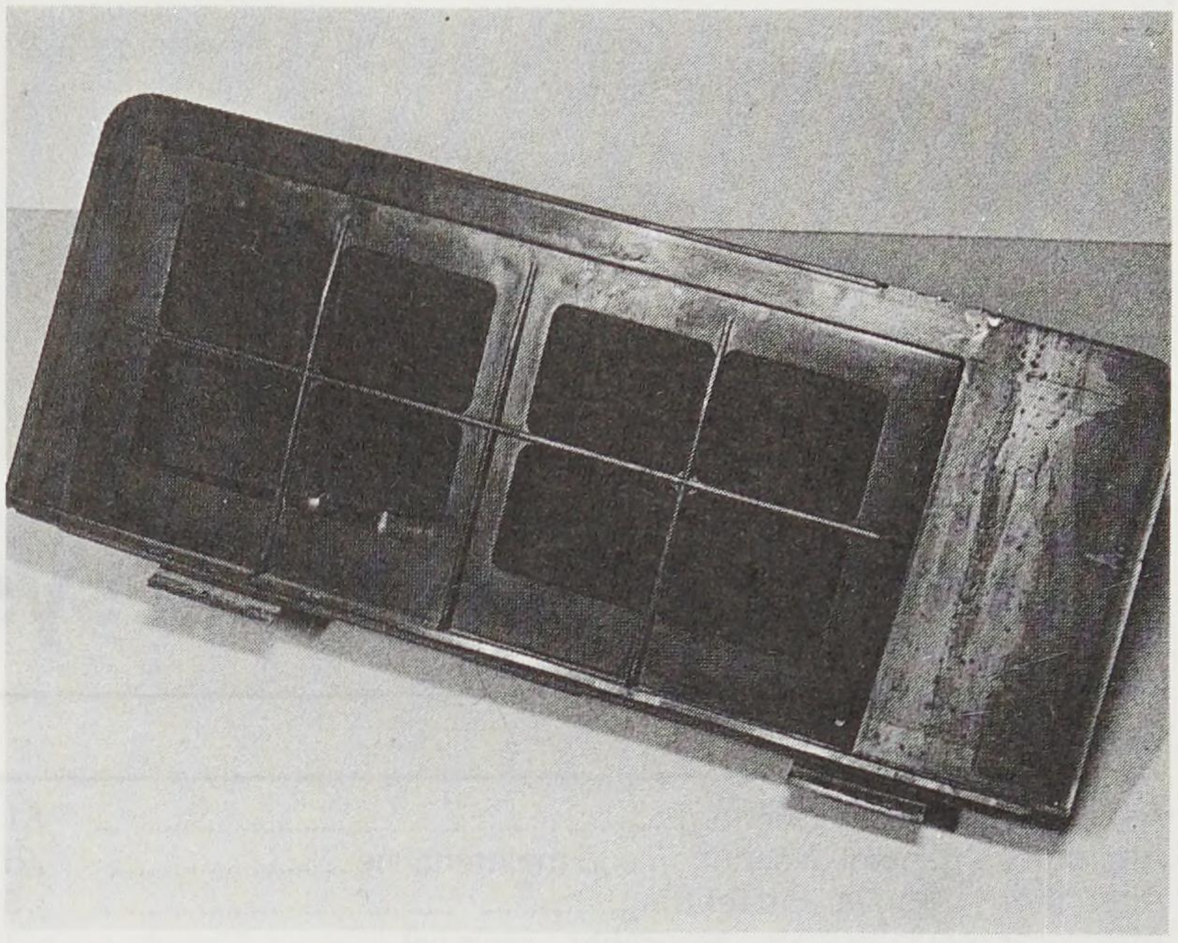


Fig 11.38 Rear underfloor panels and attachments (Sec 65)

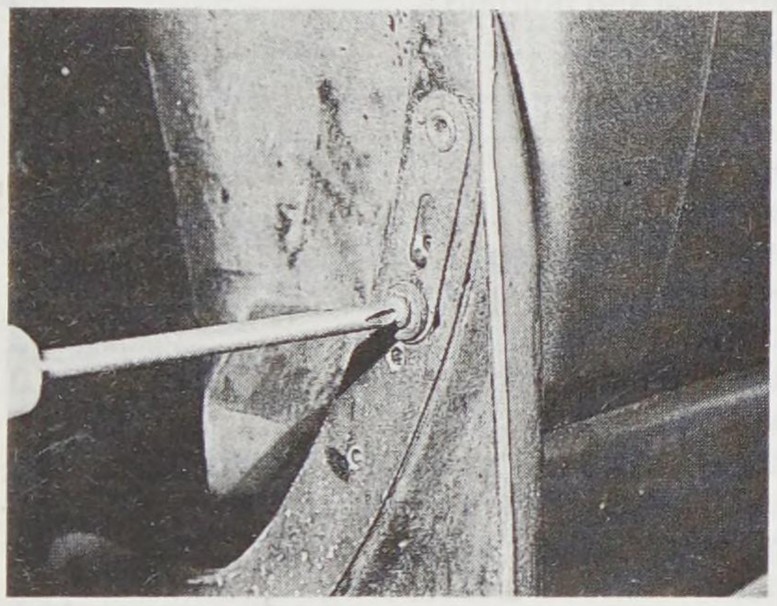
Fig 11.39 Front wheel arch liner and attachments (Sec 66)



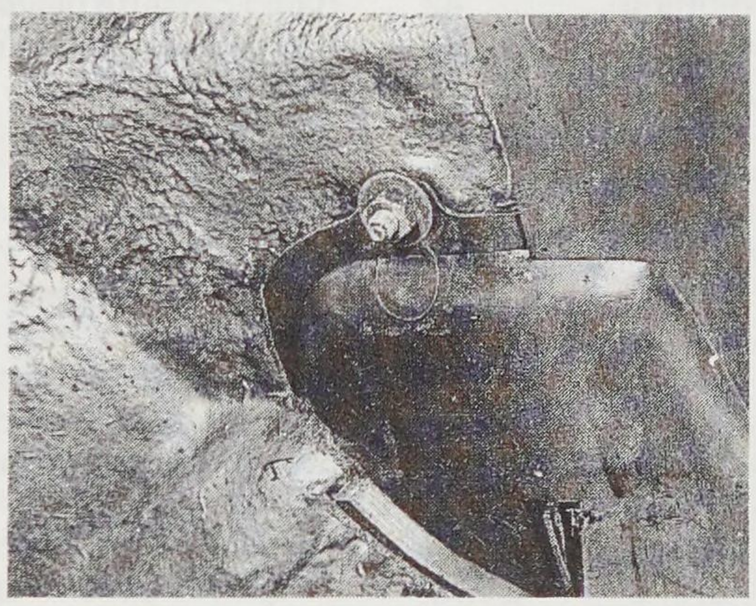
67.2A Rear air extractor duct bolts (arrowed)



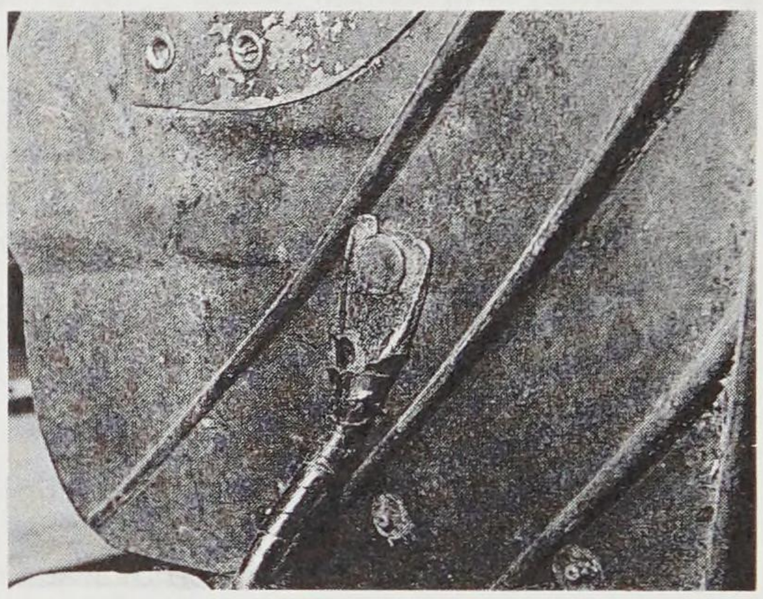
67.2B Rear air extractor rear view showing flaps



68.1 Removing a front mudflap



68.2A Rear mudflap retaining nut ...



68.2B ... and forked tool used to remove plastic clips

Chapter 12 Electrical system

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Specifications

System type	12 volt, negative earth, battery alternator and pre-engaged starter
Battery	
Type	Low-maintenance
Capacity:	
Manual transmission models	200 amp, 33 amp/hour
Automatic transmission models	250 amp, 33 amp/hour
Alternator	
Rating	1200 watt
Regulated voltage on full-load	13.8 to 14.8 at 3000 rpm
Starter motor	
Type	Pre-engaged

Fuses

Number	Circuit protected	Rating (amps)
1	Heated rear window and heated mirrors	15 (up to 1989), 20 (1989-on)
2	Left-hand tail lamp	5
3	Rear fog lamp and front foglamp switch	5
4	Side, number plate, instrument panel, console and clock lighting and rheostat	10

Fuses – continued

Number	Circuit protected	Rating (amps)
5	Ignition controlled positive, courtesy lamp delay, compressor relay, air conditioning relay and temperature unit, oil level sender, tachometer, brake warning lamp, reversing lamps and cooling fan relay	10
6	Accessories positive, windscreen wash/wipe, brake lamps, glovebox and map reading lamp, pressure switch	15
7	Hazard warning lamps	15 (up to 1989), 20 (1989-on)
8	Window lift relay positive, sunroof roof relay, boot and clock lamps; central door locking unit, front and rear courtesy lamps, radio memory	20
9	Radio, battery or accessories positive	5
10	Accessories positive, heated rear screen switch, front and rear window lift, sun roof relay, electric windows, heated seats and clock lamp	15
11	Right-hand tail lamp	5
12	Accessories positive and ABS control supply	10
13	Rear window lift	20
14	Front window lift and sunroof	25
15	Horns, horn compressor (air) and cigar lighter	15 (electric horn), 20 (air horn)
16	Left-hand driving lamp	5
17	Right-hand driving lamp	5
18	Heater	25
19	Spare	5

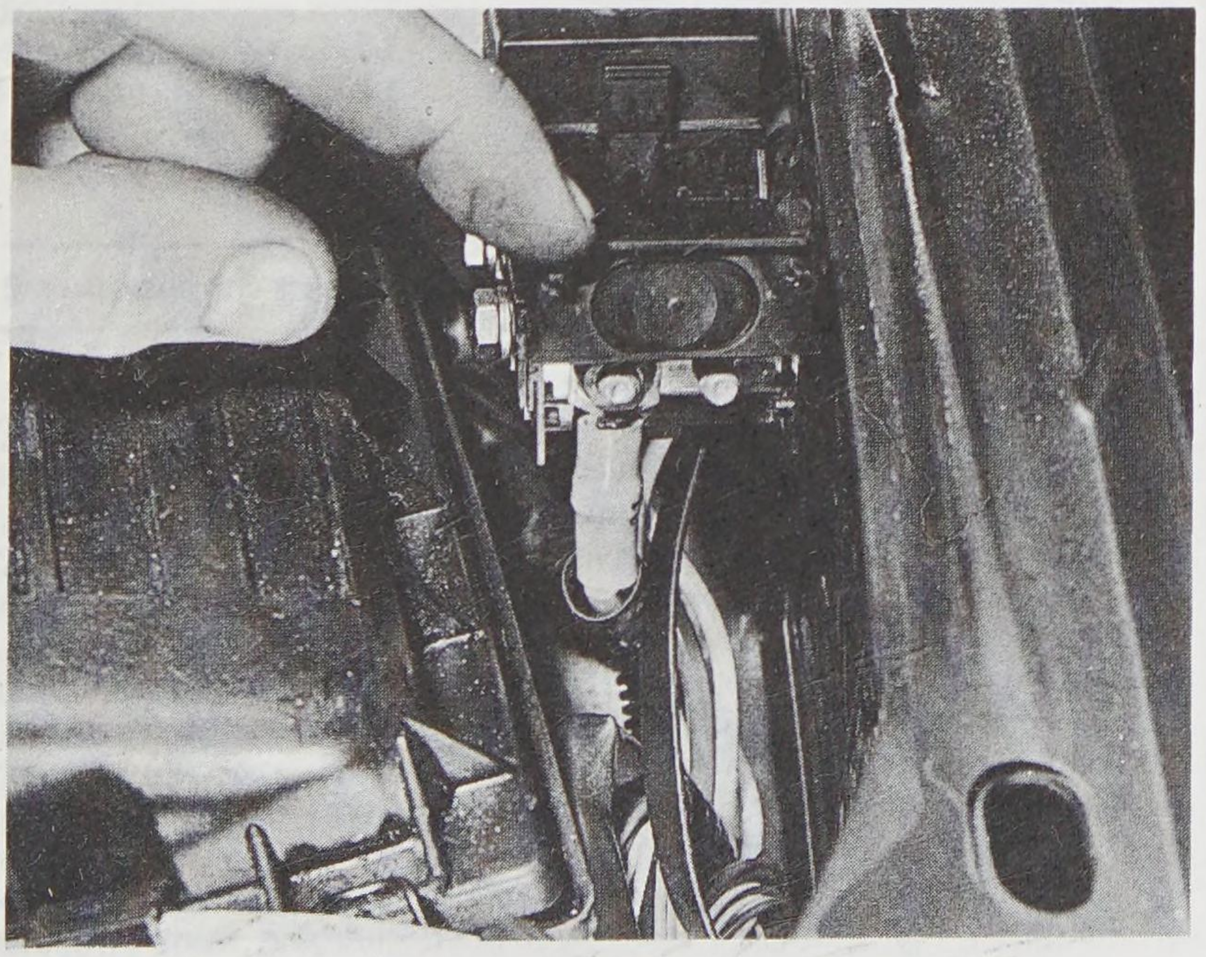
Bulbs

	Wattage
Headlamp	H4 55/60
Driving lamp	H1 55
Front fog lamp	H3 55
Front indicator	21
Front side	5
Rear indicator	21
Reversing lamp	21
Rear fog lamp	21
Stop/tail lamp	21/5
Number plate lamp	5
Tail lamp	5
Side repeater lamp	5

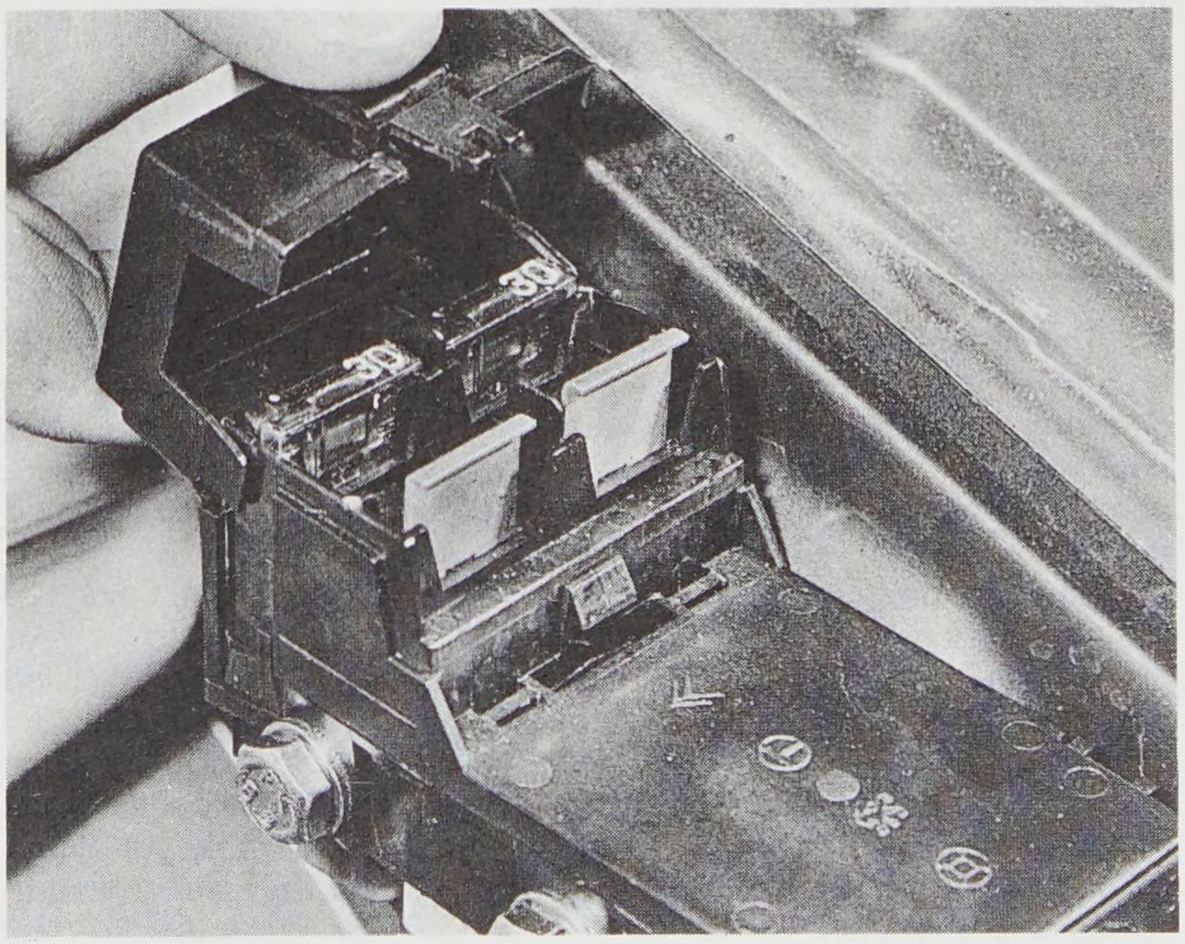
1 General description

The electrical system is of the 12 volt negative earth type and the major components consist of a battery, of which the negative terminal is earthed, an alternator which is belt-driven from the crankshaft pulley, and a starter motor.

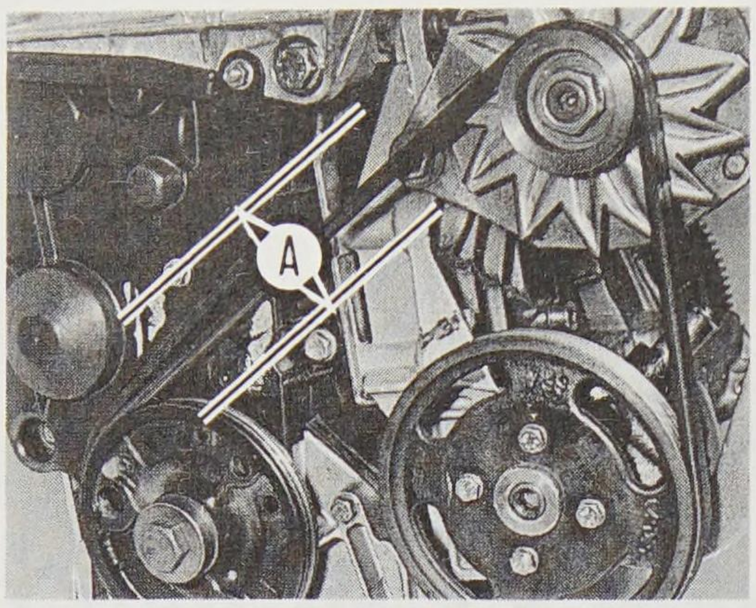
The battery supplies a steady amount of current for the ignition, lighting and other electrical circuits and provides a reserve of electricity when the current consumed by the electrical equipment exceeds that being produced by the alternator.



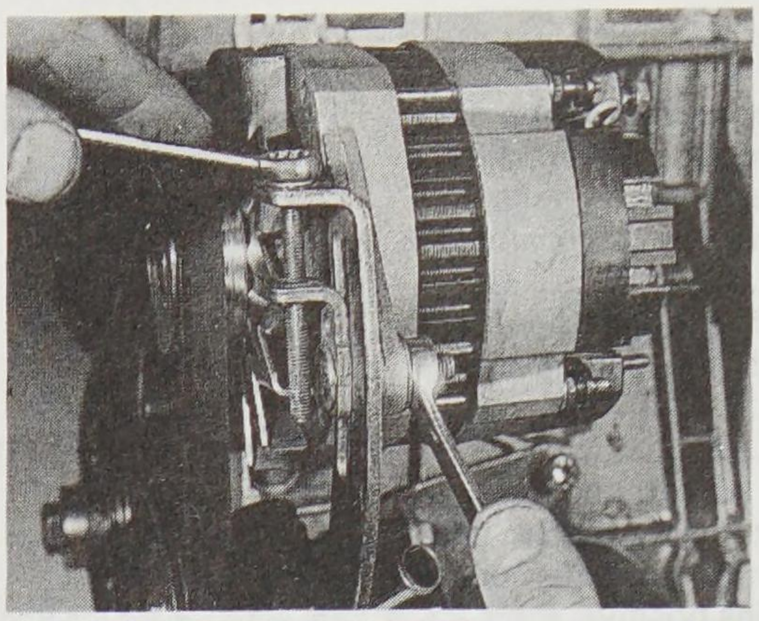
1A Battery positive unit ...

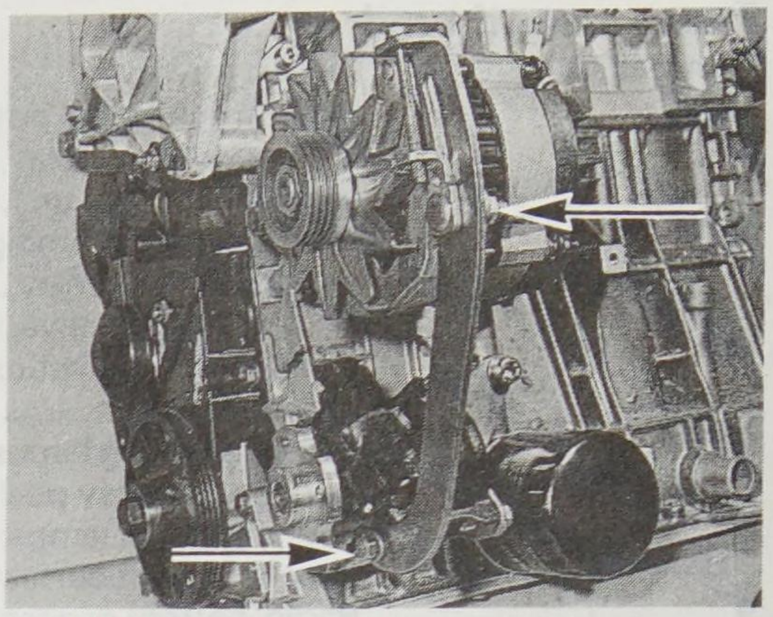


1B ... and fuses



2.2A Alternator drivebelt deflection (A)


2.2B Adjusting the belt tension


2.2C Adjuster strap bolts (arrowed)

The alternator is controlled by a regulator which ensures a high output if the battery is in a low state of charge or the demand from the electrical equipment is high, and a low output if the battery is fully charged and there is little demand for the electrical equipment.

It is important that both battery leads are always disconnected if the battery is to be boost charged; also, if body repairs are to be carried out using electric arc welding equipment, the alternator must be disconnected, otherwise serious damage can be caused to the more delicate instruments. Whenever the battery has to be disconnected it must always be reconnected with the negative terminal earthed. A battery positive (or battery plus) unit is bolted to the inner wing near to the battery. Its function is to act as a junction block for additional supplies from the battery positive terminal, and contains its own 30 amp fuses (photos).

2 Maintenance and inspection

At the intervals given in the 'Routine maintenance' *section at the beginning of this manual, carry out the following operations.*

1 Check the battery terminals for cleanliness and security as described in Section 3. Also check the battery clamp and tray for corrosion and security.

2 Check and adjust the alternator drivebelt. The belt must be in good condition, free from fraying, cuts, splits and cracking due to hardening. The belt tension must be adjusted so that with moderate thumb pressure applied mid-way along the belt's longest run, it can be deflected by approximately 6.0 mm. If not, adjust the tension by loosening the alternator mounting bolts and adjustment strap bolts and turning the adjuster bolt in or out to obtain the correct tension (photos). Tighten the bolts on completion. The operation is the same for vehicles with or without power-assisted steering. Where air conditioning is fitted, refer to Chapter 11, Section 57.

3 Check the operation of all electrical services (lights, wipers, horn etc) and rectify any faults found.

3 Battery – maintenance and inspection

1 The battery fitted as original equipment is of low-maintenance type; however, on some models, it incorporates the standard cell covers for checking the electrolyte level (photo). Under normal conditions it is not necessary to check the level, but if the battery is subject to severe conditions such as taxi work or extreme temperatures, the level should be checked every 10 000 miles (15 000 km).

2 When topping-up is required use only distilled water and cover the battery plates to a depth of 10.0 mm (0.40 in) (photo).

3 Acid should never be required if the battery has been correctly filled from new, unless spillage has occurred.

4 Inspect the battery terminals and mounting tray for corrosion. This is the white fluffy deposit which grows at these areas. If evident, clean it away and neutralise it with ammonia or baking soda. Apply petroleum jelly to the terminals and paint the battery tray with a suitable anti-corrosion preparation.

5 Keep the top surface of the battery casing dry.

3.1 Removing the cover from battery

6 An indication of the state of charge of a battery can be obtained by checking the electrolyte in each cell using a hydrometer. The specific gravity of the electrolyte for fully charged and fully discharged conditions at the electrolyte temperature indicated, is listed below.

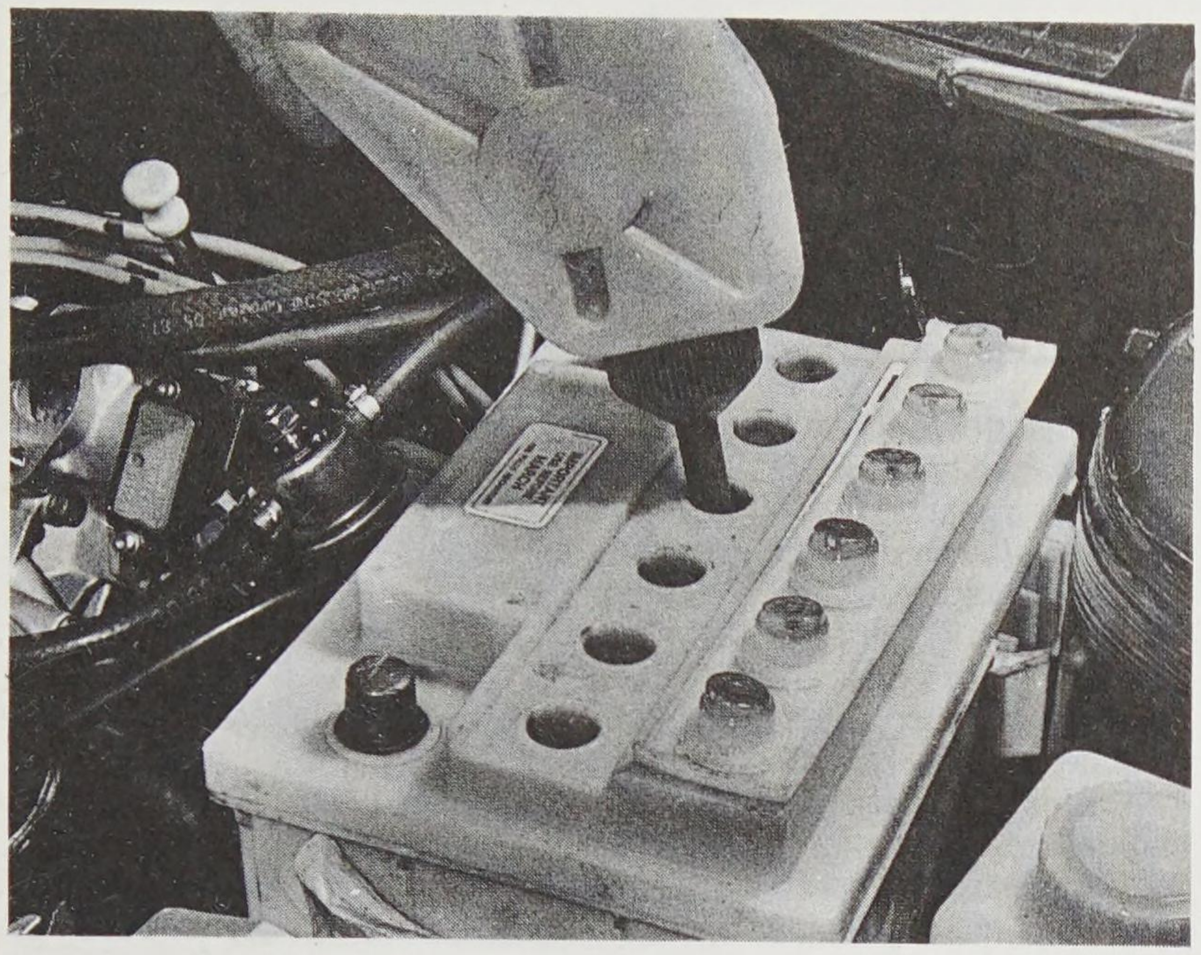
Fully discharged	Electrolyte temperature	Fully charged
1.098	38°C (100°F)	1.268
1.102	32°C (90°F)	1.272
1.106	27°C (80°F)	1.276
1.110	21°C (70°F)	1.280
1.114	16°C (60°F)	1.284
1.118	10°C (50°F)	1.288
1.122	4°C (40°F)	1.292
1.126	–1.5°C (30°F)	1.296

7 There should be very little variation in the readings between the different cells, but if a difference is found in excess of 0.025 then it will probably be due to an internal fault indicating impending battery failure. This assumes that electrolyte has not been spilled at some time and the deficiency made up with water only.

8 If electrolyte is accidentally spilled at any time, mop up and neutralise the spillage at once. Electrolyte attacks and corrodes metal rapidly; it will also burn holes in clothing and skin. Leave the addition of acid to a battery cell to your dealer or service station as the mixing of acid with distilled water can be dangerous.

9 Never smoke or allow naked lights near the battery; the hydrogen gas which it gives off is explosive.

10 With normal motoring, the battery should be kept in a good state of charge by the alternator and never need charging from a mains charger.



3.2 Topping-up a battery cell

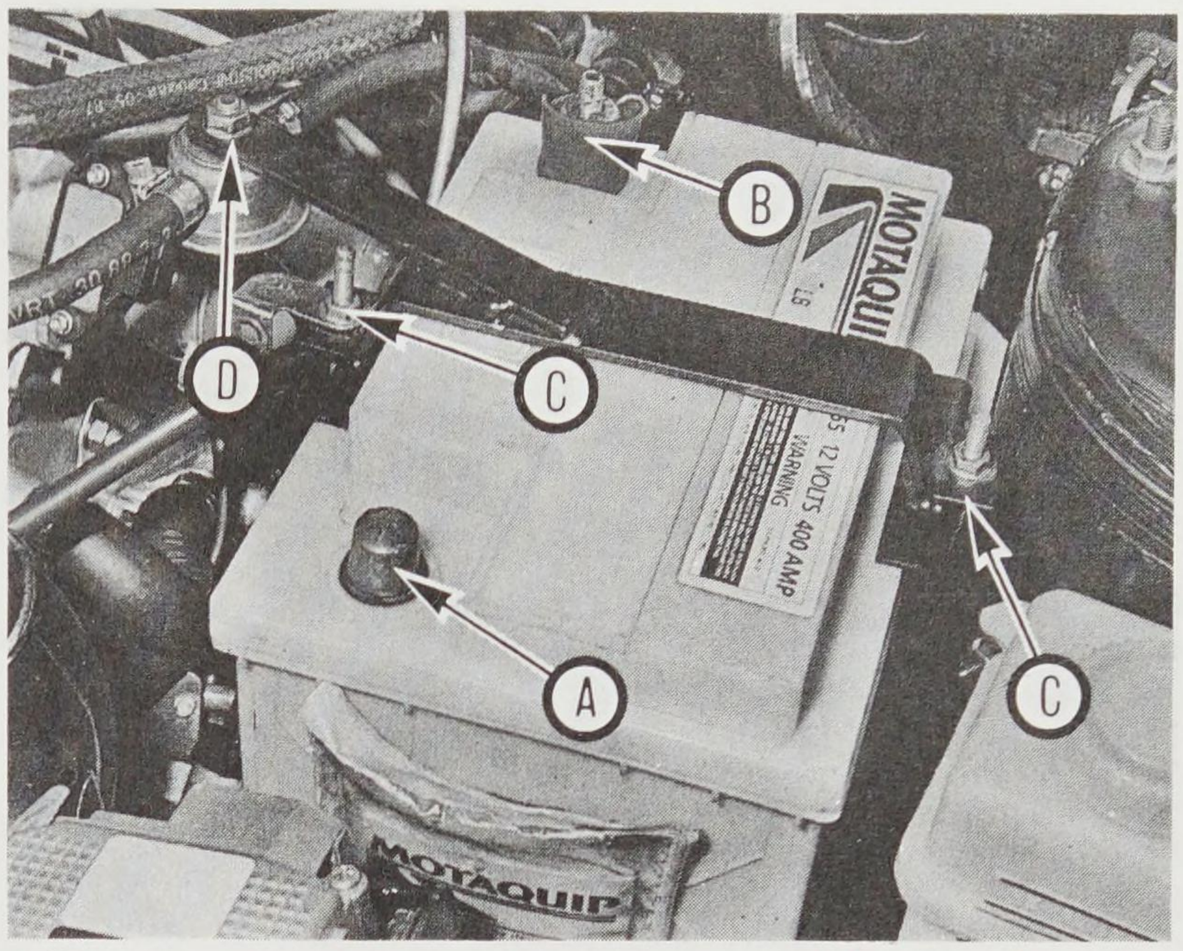
11 However, if the daily mileage is low, with much use of starter and electrical accessories, it is possible for the battery to become discharged owing to the fact that the alternator is not in use long enough to replace the current consumed.
12 Also, as the battery ages, it may not be able to hold its charge and some supplementary charging may be needed. Before connecting the charger, disconnect the battery terminals or, better still, remove the battery from the vehicle.
13 Specially rapid 'boost' charges which are claimed to restore the power of the battery in 1 to 2 hours are most dangerous as they can cause serious damage to the battery plates through overheating.
14 While charging the battery note that the temperature of the electrolyte should never exceed 38°C (100°F).
15 When charging a low maintenance battery **do not** remove the cell covers; however, on other types of battery, the cell covers should be removed.

4 Battery – removal and refitting

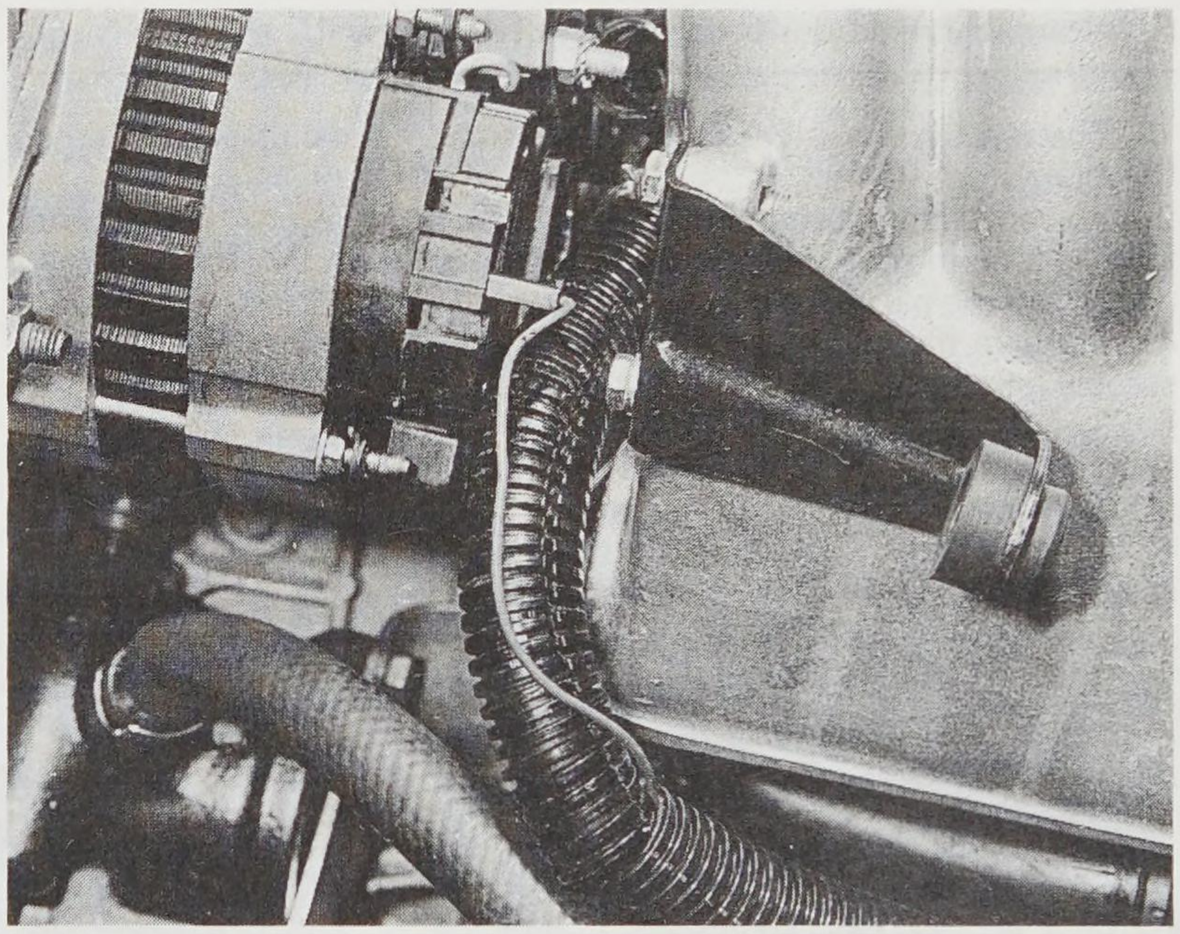
1 The battery is located at the right-hand rear corner of the engine bay when viewed from the front of the vehicle.
2 Disconnect the battery terminals, negative terminal first, by unscrewing the wing nuts. The negative terminal must always be disconnected first, and reconnected last.
3 Release the battery clamp and carefully lift the battery from the battery tray. Note the fuel damper bracket on fuel injection models and the fuel pipes on carburettor models (photo).
4 Refit in reverse order, smearing the battery terminals with petroleum jelly which reduces corrosion build up on the terminals.

5 Alternator – general description and maintenance

1 All models covered by this manual are fitted with alternators. The alternator generates alternating current (AC) which is rectified by diodes into direct current (DC) which is the current needed for charging the battery.
2 The main advantage of the alternator lies in its ability to provide a high charge at low revolutions. Driving slowly in heavy traffic with a dynamo invariably means no charge is reaching the battery. In similar conditions, even with the heater, wiper, lights and perhaps radio switched on, the alternator will ensure a charge reaches the battery.
3 The alternator is of the rotating field ventilated design and comprises principally a laminated stator, on which is wound the output winding, a rotor carrying the field winding and a diode rectifier.
4 The rotor is belt-driven from the engine through a pulley keyed to the rotor shaft. A fan adjacent to the pulley draws air through the unit. Rotating is clockwise when viewed from the drive end.



4.3 Battery positive terminal (A), negative terminal (B), clamp (C) and fuel damper bracket (D)

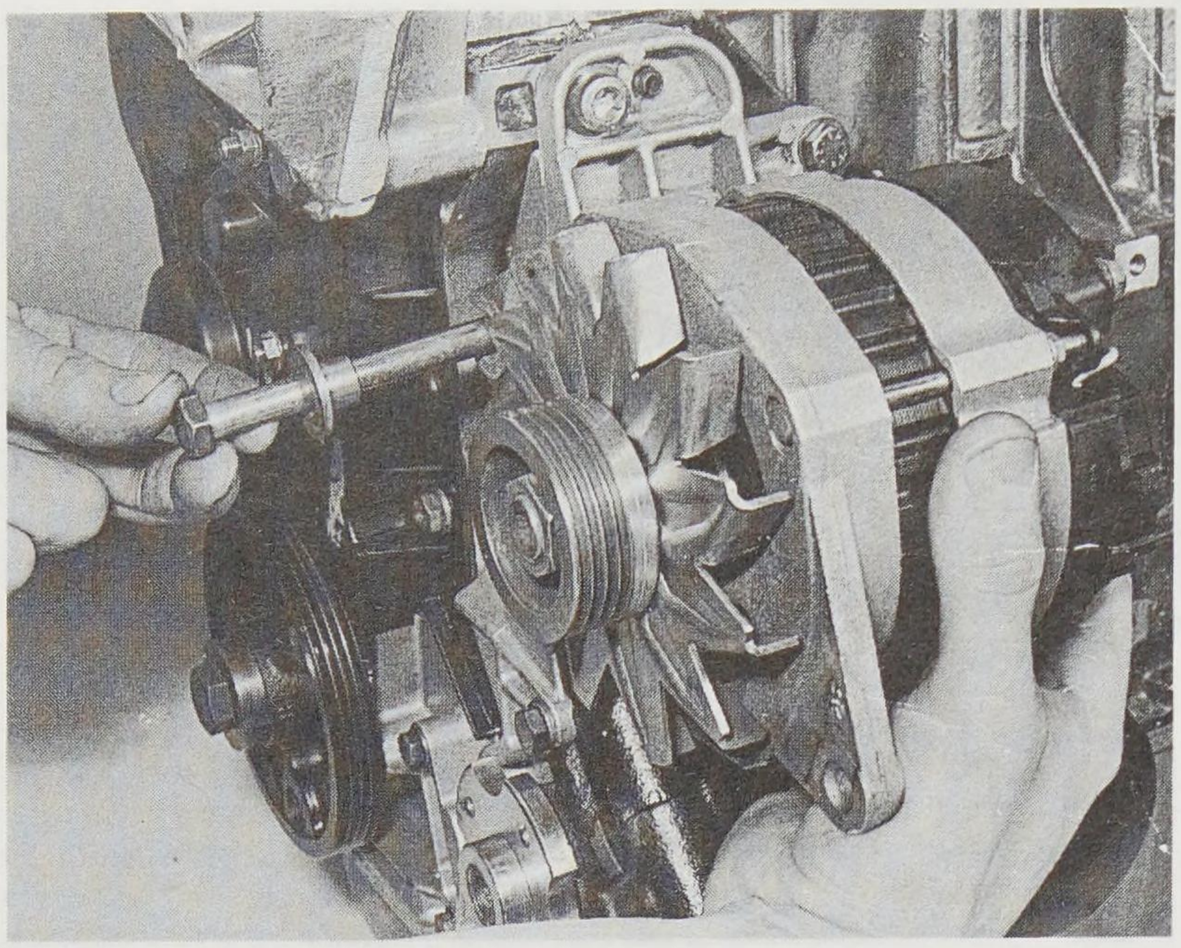


6.2 Connections on rear of alternator

5 The voltage regulator is mounted externally on the rear cover of the alternator, and contains the alternator brush assembly.
6 The equipment has been designed for the minimum amount of maintenance in service, the only items subject to wear being the brushes and bearings.
7 Brushes should be examined after about 80 000 miles (120 000 km) and renewed if necessary. The bearings are pre-packed with grease for life, and should not require further attention.
8 Regularly check the drivebelt tension, as described in Section 2.

6 Alternator – removal and refitting

1 Disconnect the battery negative terminal.
2 Disconnect the electrical connections on the rear of the alternator (photo).
3 Loosen the alternator mounting and adjustment strap bolts, push the alternator inward and slip the drivebelt off the pulley.
4 Remove the adjustment strap bolts and alternator pivot bolts and lift off the alternator (photo).
5 Refit in reverse order, tensioning the belt as described in Section 2.



6.4 Removing the alternator pivot bolt

7 Alternator regulator/brush assembly – renewal

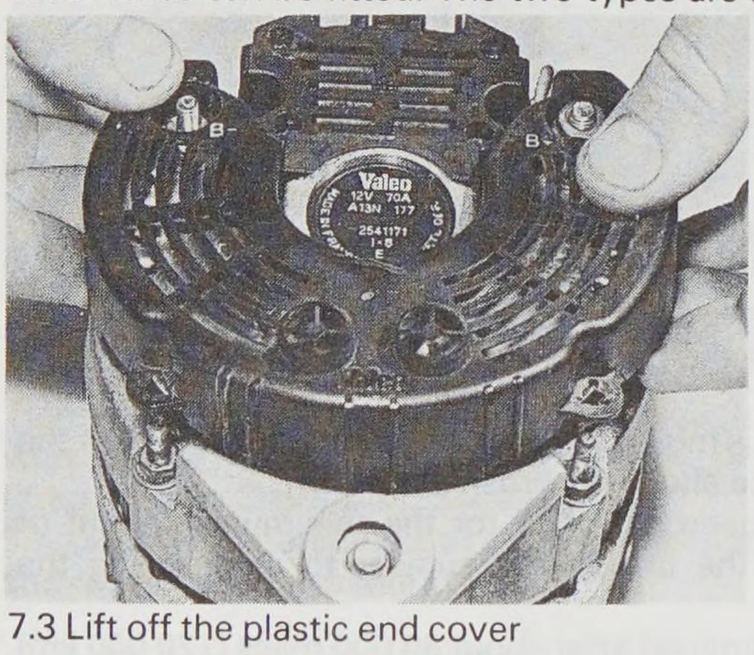
1 The regulator/brush assembly is a self-contained unit mounted on the alternator.
2 To renew the assembly if the brushes are worn or the regulator faulty, first remove the alternator as described in Section 6.
3 Lift off the plastic end cover (photo).
4 Remove the screws and withdraw the regulator/brush holder assembly (photos).
5 New brushes are approximately 12.0 mm in length. The assembly should be renewed if the brushes are worn to approximately half that length or less (photo).
6 Note that on Valeo type alternators, two regulator/brush holder assemblies can be fitted. The two types are interchangeable but have different depth baseplates (see Fig. 12.1). If the longer screws are used on the assembly with the thinner baseplate, the screws will foul the rotor.
7 Fit a new assembly in reverse order of removal.

8 Starter motor – description and testing

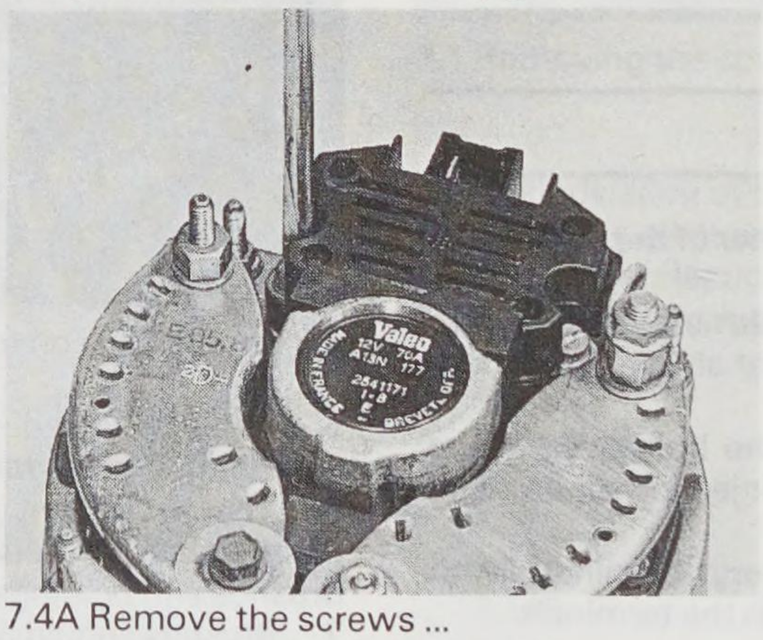
1 The starter motor is mounted on the front of the engine and is of the pre- engaged type, where the drive pinion is brought into mesh with the starter ring gear on the flywheel before the main current is applied.
2 When the starter switch is operated, current flows from the battery to the solenoid which is mounted on the top of the starter motor body. The plunger in the solenoid moves inwards, so causing a centrally pivoted lever to push the drive pinion into mesh with the starter ring gear. When the solenoid plunger reaches the end of its travel, it closes an internal contact and full starting current flows to the starter field coils. The armature is then able to rotate the crankshaft, so starting the engine.
3 A special freewheel clutch is fitted to the starter drive pinion so that as soon as the engine fires and starts to operate on its own it does not drive the starter motor.
4 When the starter switch is released, the solenoid is de-energised and a spring moves the plunger back to its rest position. This operates the pivoted lever to withdraw the drive pinion from engagement with the starter ring.
5 If the starter motor fails to turn the engine when the switch is operated there are four possible reasons why:

(a) The battery is discharged or faulty
(b) The electrical connections between switch, solenoid, battery and starter motor are somewhere failing to pass the necessary current from the battery, through the starter, to earth
(c) The solenoid has an internal fault
(d) The starter motor is electrically defective.

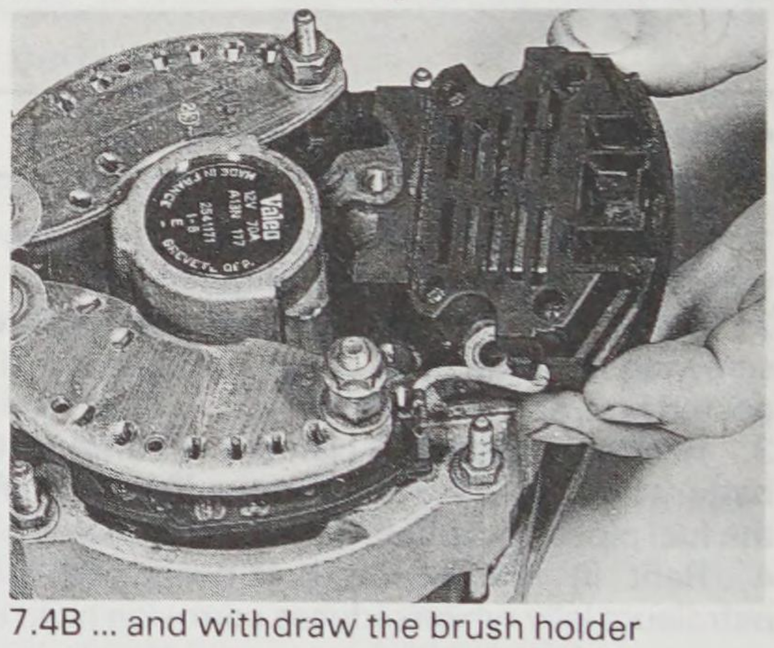
6 To check the battery, switch on the headlights. If they go dim after a few seconds the battery is discharged. If the lamp glows brightly, next operate the ignition/starter switch and see what happens to the lights. If they go dim it is indicative that power is reaching the starter motor but



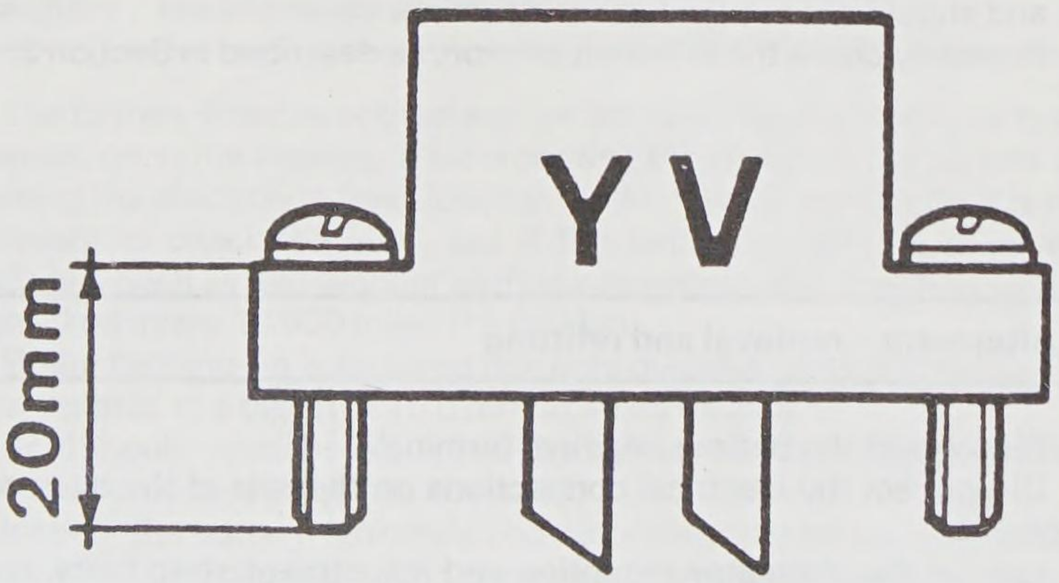
7.3 Lift off the plastic end cover



7.4A Remove the screws ...



7.4B ... and withdraw the brush holder



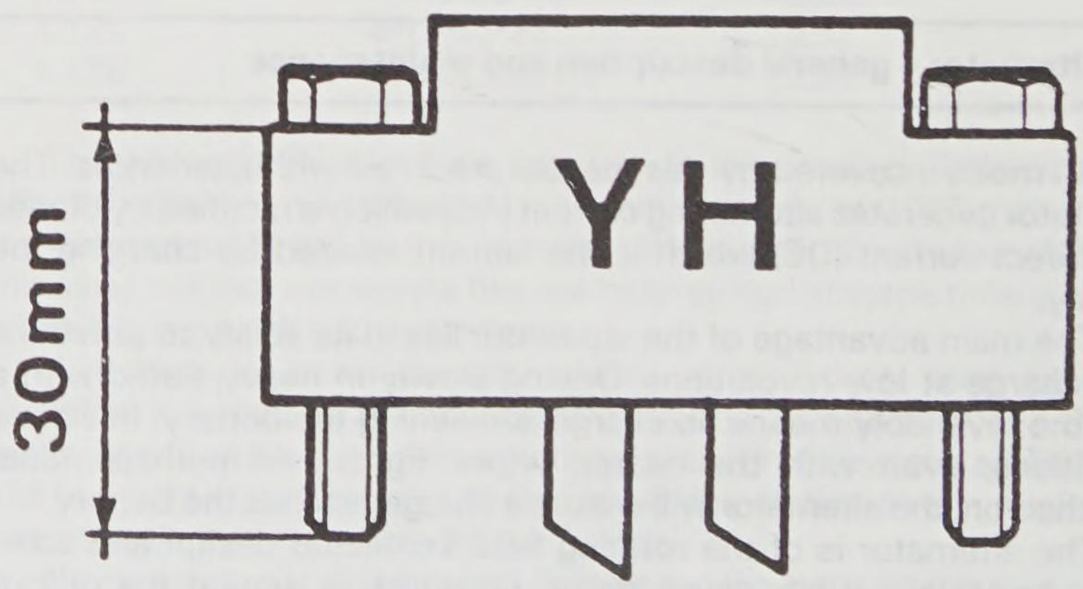
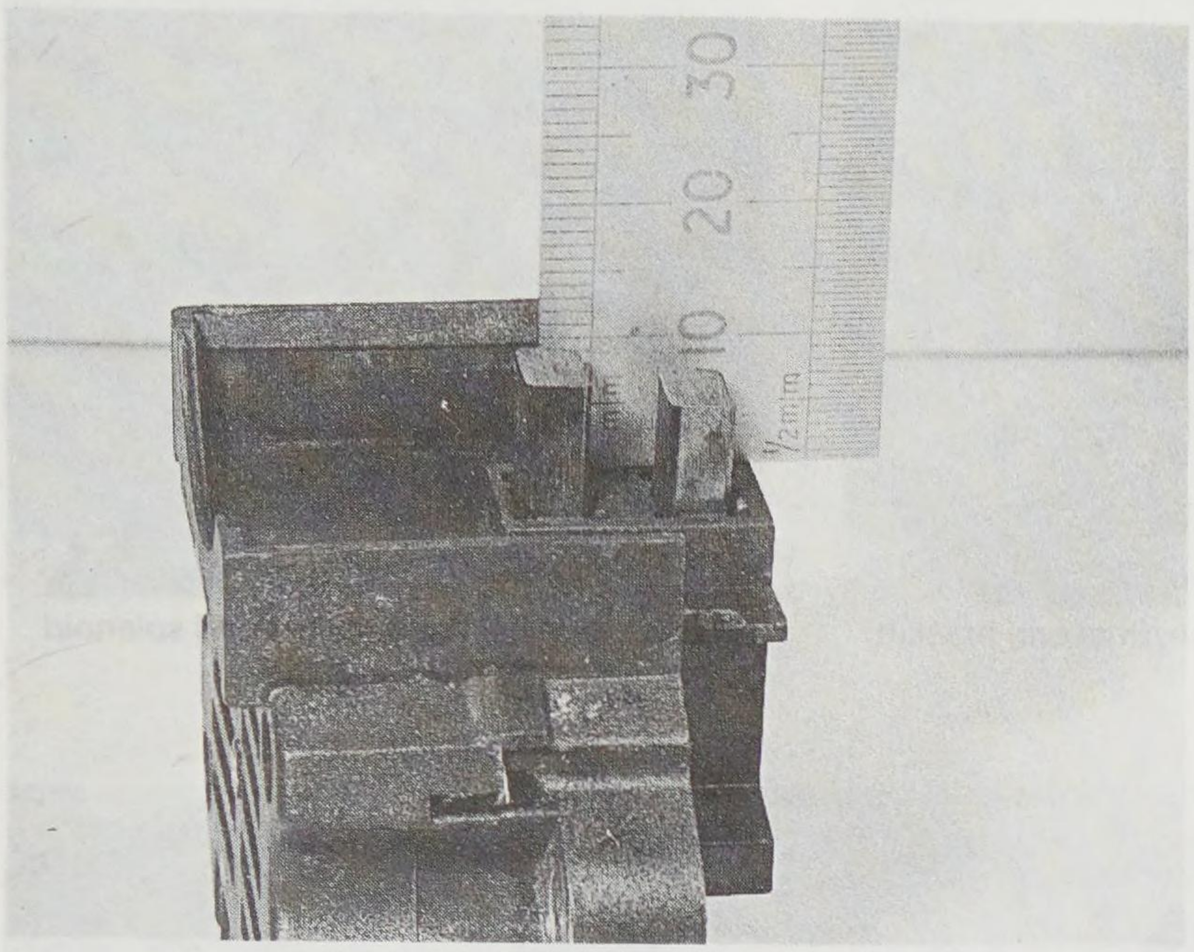


Fig 12.1 Showing different alternator brush holder assemblies (Sec 7)



7.5 Measuring brush length

failing to turn it. If the starter should turn very slowly go on to the next check.

7 If, when the ignition/starter switch is operated, the lights stay bright then the power is not reaching the starter motor. Check all connections from the battery to solenoid for cleanliness and tightness. With a good battery fitted this is the most usual cause of starter motor problems. Check that the earth cable between the engine and body is also intact and cleanly connected. This can sometimes be overlooked when the engine is taken out.

8 If no results have yet been achieved turn off the headlights, otherwise the battery will soon be discharged. It may be possible that a clicking noise was heard each time the ignition/starter switch was operated. This is the solenoid switch operating but it does not necessarily follow that the main contact is closing properly. (If no clicking has been heard from the solenoid it is certainly defective.) The solenoid contact can be checked by putting a voltmeter or bulb between the main cable connection on the starter side of the solenoid and earth. When the switch is operated there should be a reading or a lighted bulb. If not, the switch has a fault.

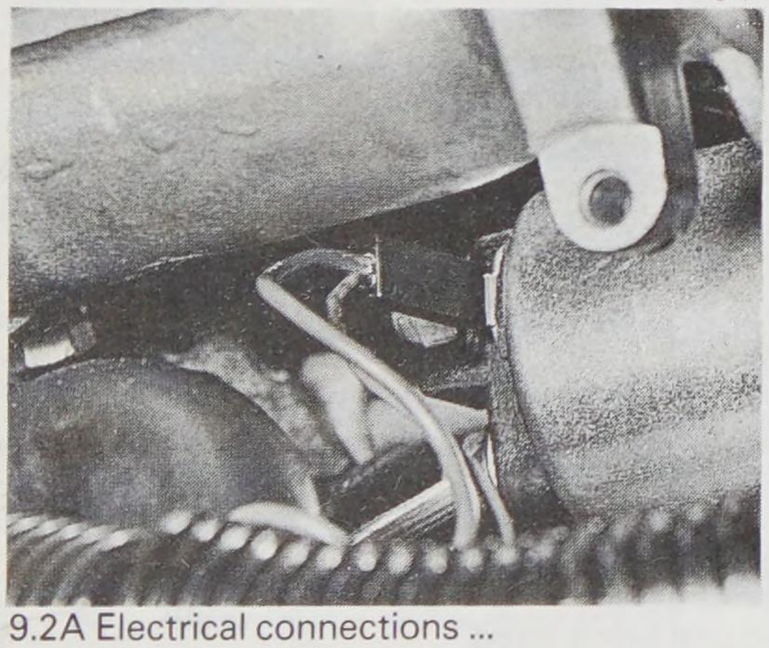
9 Starter motor – removal and refitting

1 Disconnect the battery negative terminal.
2 Disconnect the electrical connections to the starter motor (photos).
3 Loosen the bolts securing the rear support bracket to the cylinder block (photo).
4 Undo the nuts securing the rear of the starter motor to the support bracket.
5 Remove the bolts securing the starter motor to the gearbox housing.
6 Unclip the crankcase breather hose from the bracket.
7 Swing the bracket rearward, then manoeuvre the starter motor from the engine.
8 Refit in reverse order.

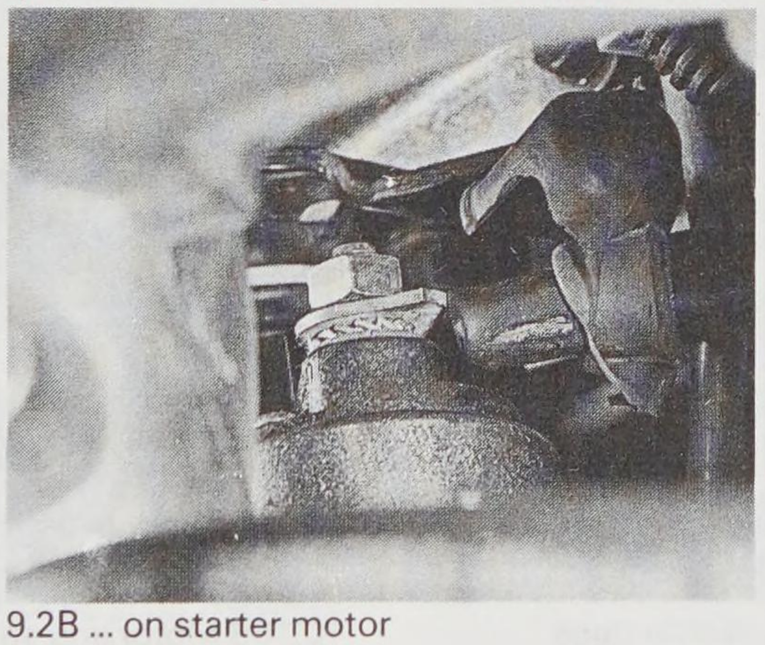
10 Starter motor – dismantling and reassembly

Note: *This procedure describes the dismantling of a Valeo type starter motor. Other types may be found fitted, the procedure for which will be similar.*

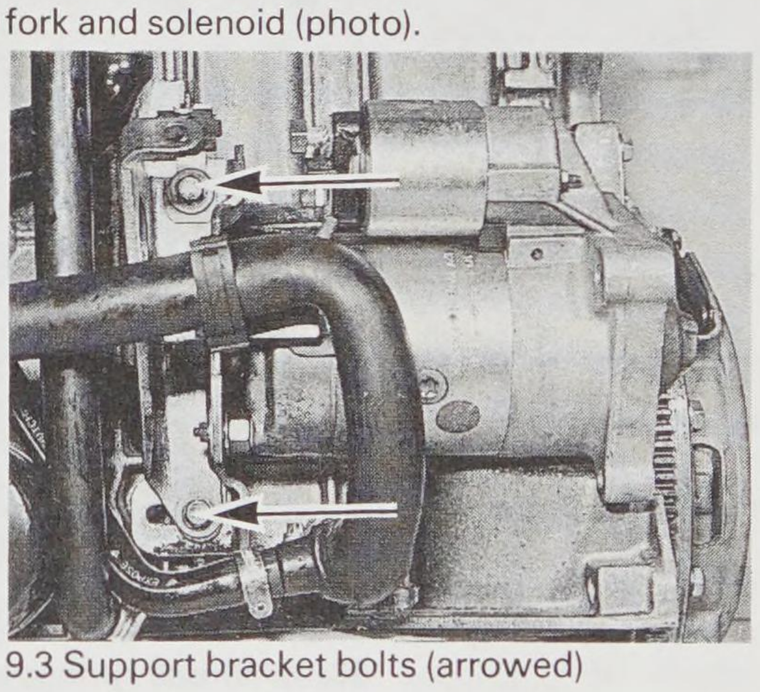
1 Make alignment marks across the drive end bracket and motor and solenoid covers.
2 Disconnect the motor lead from the solenoid.
3 Unscrew the through-bolts and remove the solenoid from the drive end bracket, noting the spring (photo).
4 Undo the through-bolts on the motor cover (photo).
5 Undo the end cover bolts and remove the cover (photo).
6 Tap out the solenoid thrower fork pivot pin and withdraw the drive end bracket (photos).
7 Remove the thrower fork and solenoid (photo).



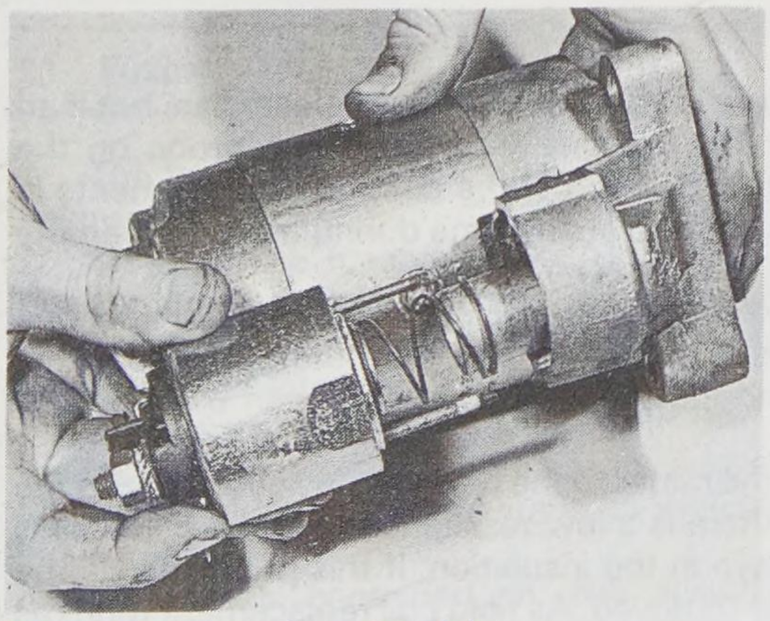
9.2A Electrical connections ...



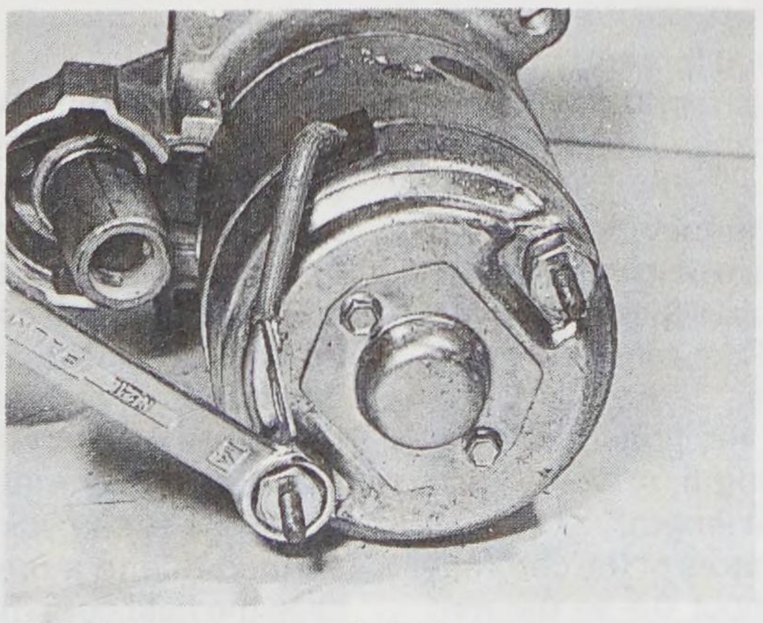
9.2B ... on starter motor



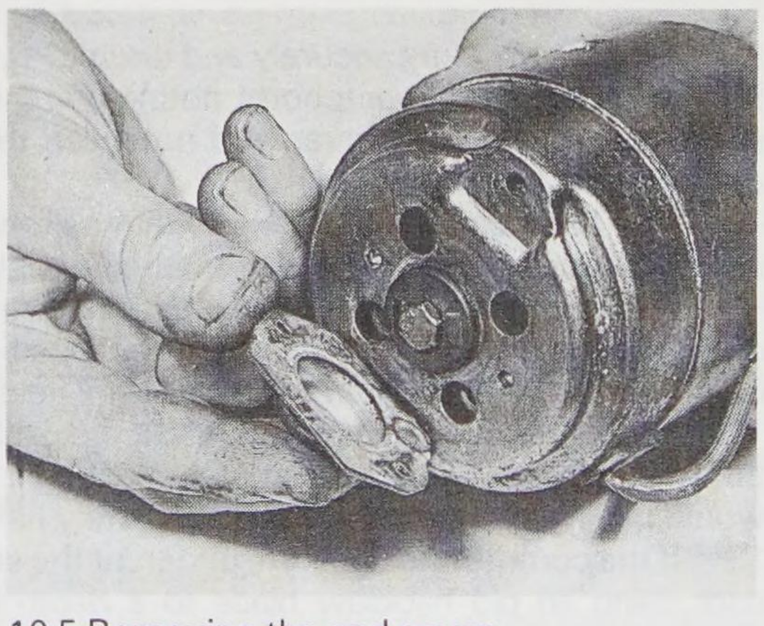
9.3 Support bracket bolts (arrowed)



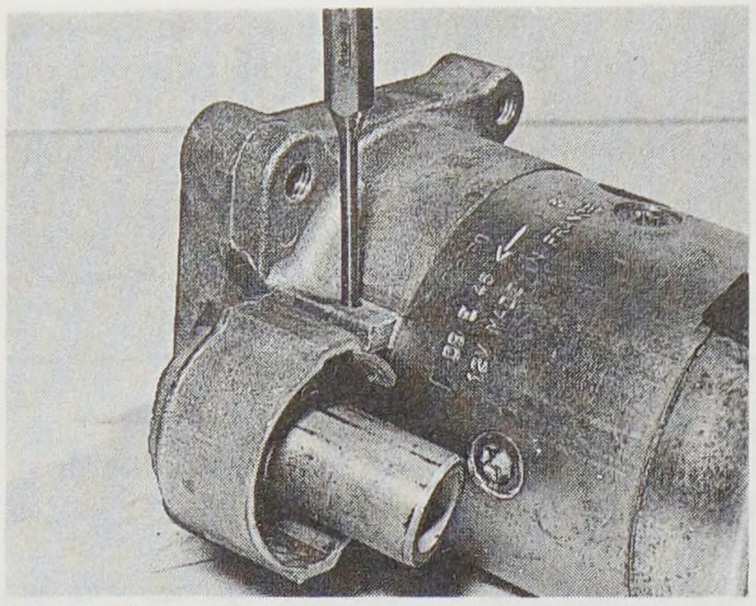
10.3 Removing the solenoid



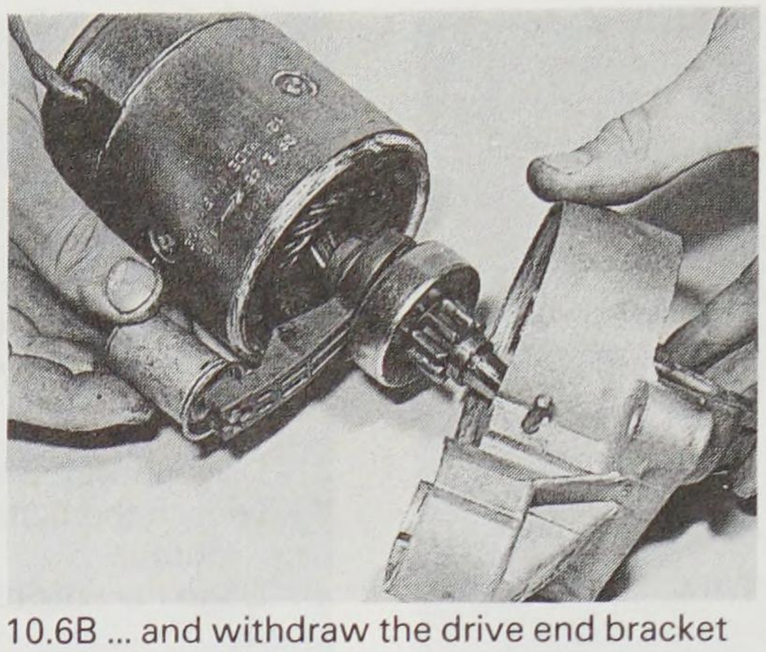
10.4 Undo the through-bolts



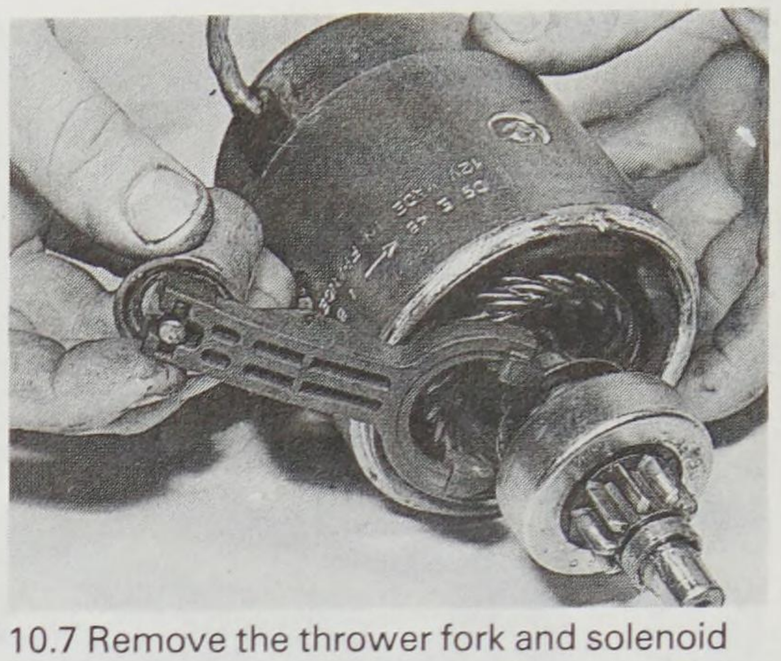
10.5 Removing the end cover



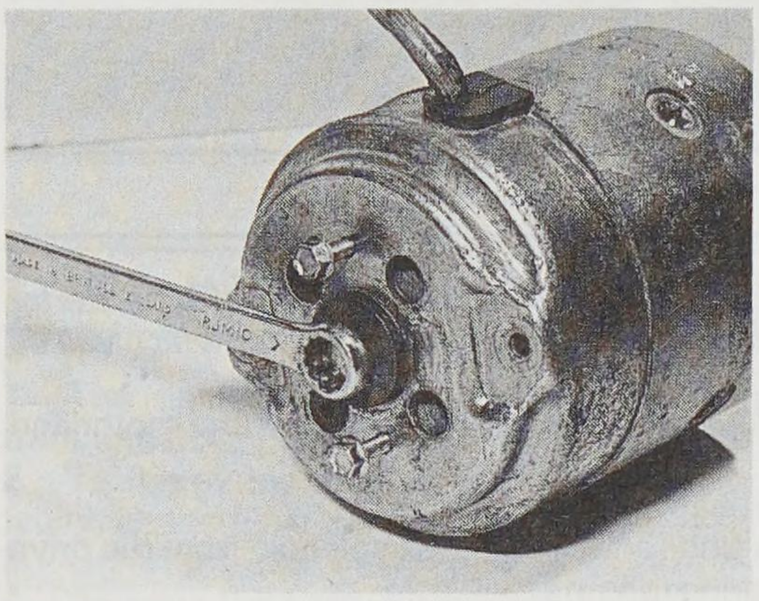
10.6A Tap out the thrower fork pivot pin ...



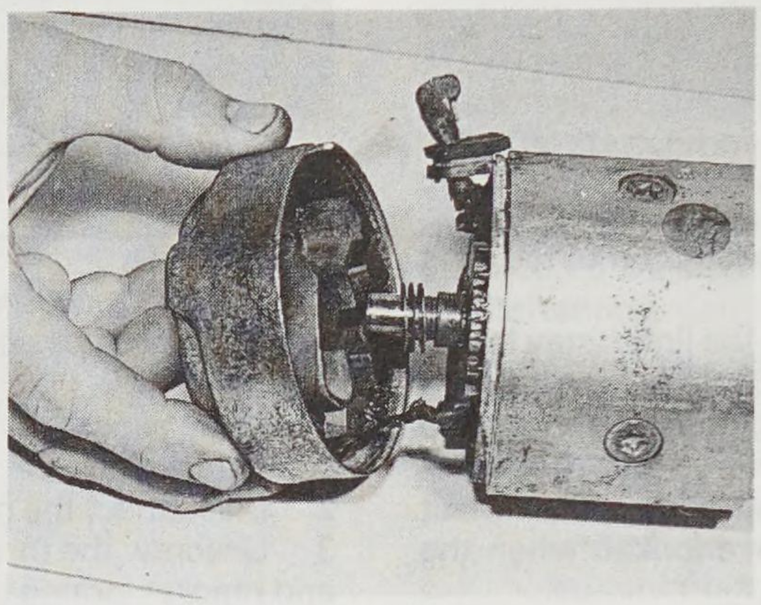
10.6B ... and withdraw the drive end bracket



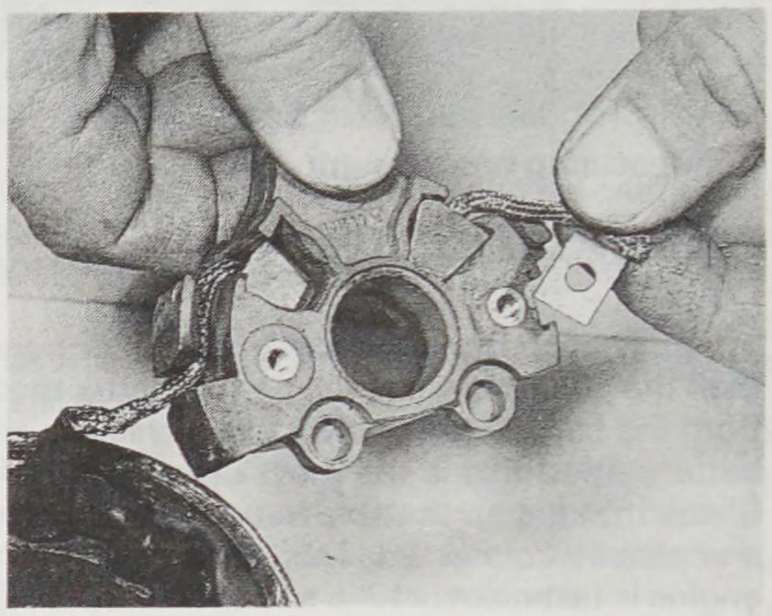
10.7 Remove the thrower fork and solenoid



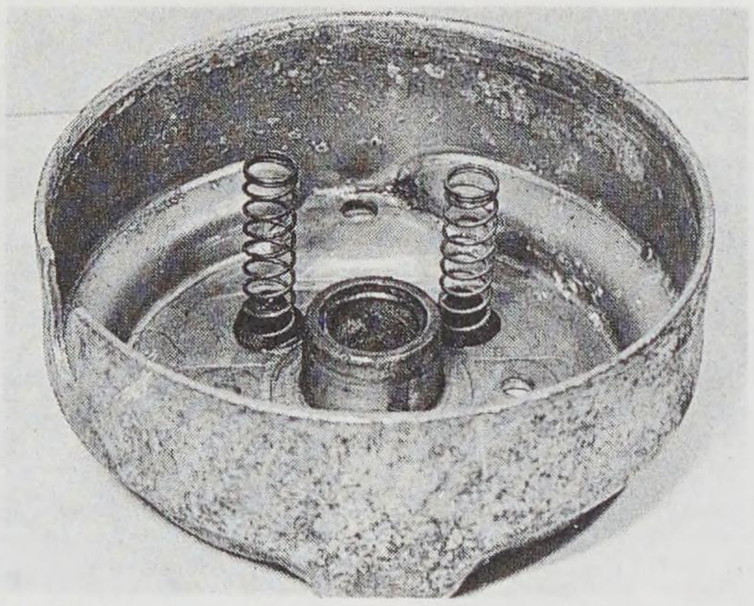
10.8 Undo the end bolt ...



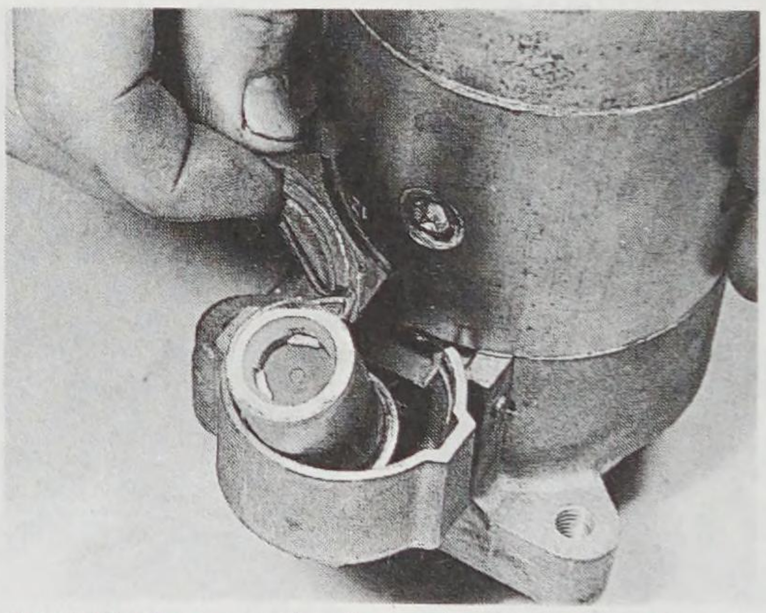
10.9 ... and lift off the end cover



10.10 Brushes and brush moulding



10.18A Brush springs located over pegs



10.18B Motor and solenoid seal being fitted

8 Hold the armature securely and undo the end bolt (photo).

9 Lift off the end cover (photo), noting that the brush springs will exert some pressure on the cover, and note also the position of any washers/shims on the armature shaft.

10 The brushes are contained within a composite moulding. One is secured by the end cover bolt, the other is soldered in place (photo).

11 The removal of the brush holder therefore requires the unsoldering of the old brush and soldering the new in position. Take care during this operation not to allow heat to damage the field coils.

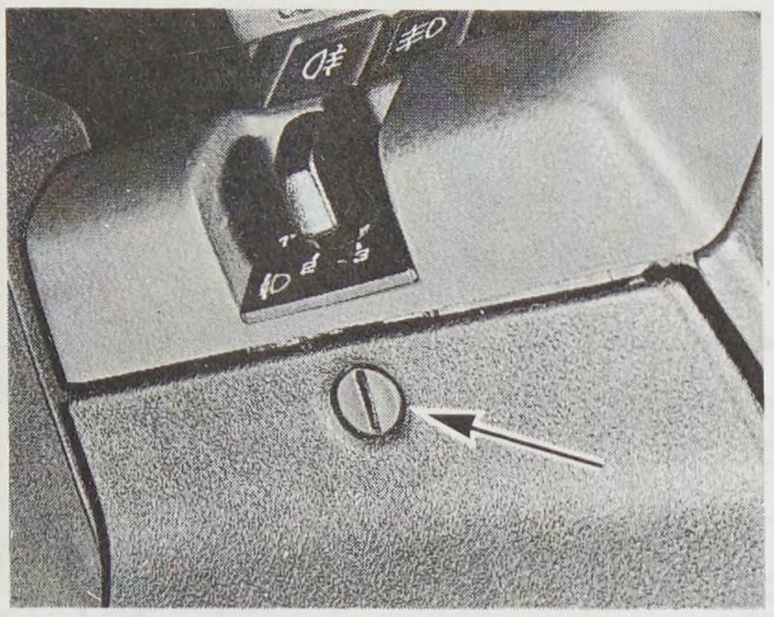
12 No figures for brush length were available at the time of writing, but new brushes are approximately 10.0 mm in length. A worn brush would be anything less than approximately half that length.

13 If the commutator is worn, undercut the separators of the commutator using an old hacksaw blade to a depth of about 0.5 to 0.8 mm (0.02 to 0.03 in). The commutator may be further surface cleaned using a strip of very fine glass paper. Do not use emery cloth for this purpose as the carborundum particles will become embedded in the copper surfaces.

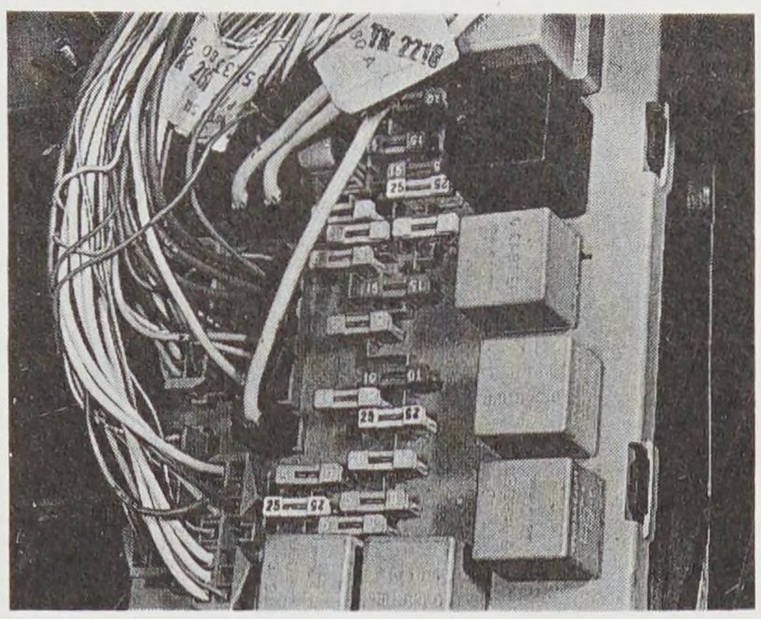
14 Testing of the armature is best left to an auto-electrician, but if an ohmmeter is available it can be done by placing one probe on the armature shaft and the other on each of the commutator segments in turn. If there is a reading indicated at any time during the test, then the armature is defective and must be renewed.

15 The field coil can also be tested using an ohmmeter. Connect one probe to the field coil positive terminal and the other to the positive brush holder. If there is no indication of a reading then the field coil circuit has a break in it.

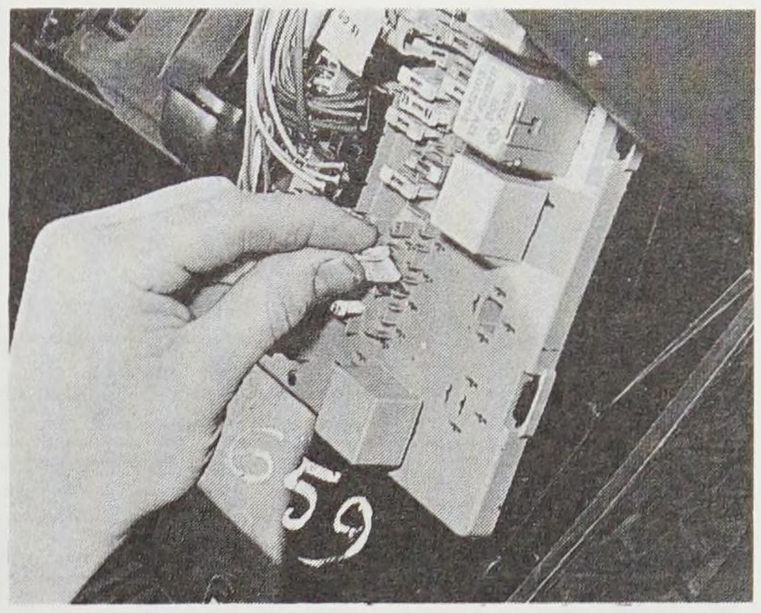
16 Connect one lead of the meter to the field coil positive lead and the other one to the yoke. If there is a low resistance then the field coil is earthed due to a breakdown in the insulation. If this proves to be the case the field coils must be renewed. As field coil replacement requires special tools and equipment it is a job that should be entrusted to your auto-electrician. In fact it will probably prove more economical and beneficial to exchange the starter motor for a reconditioned unit.



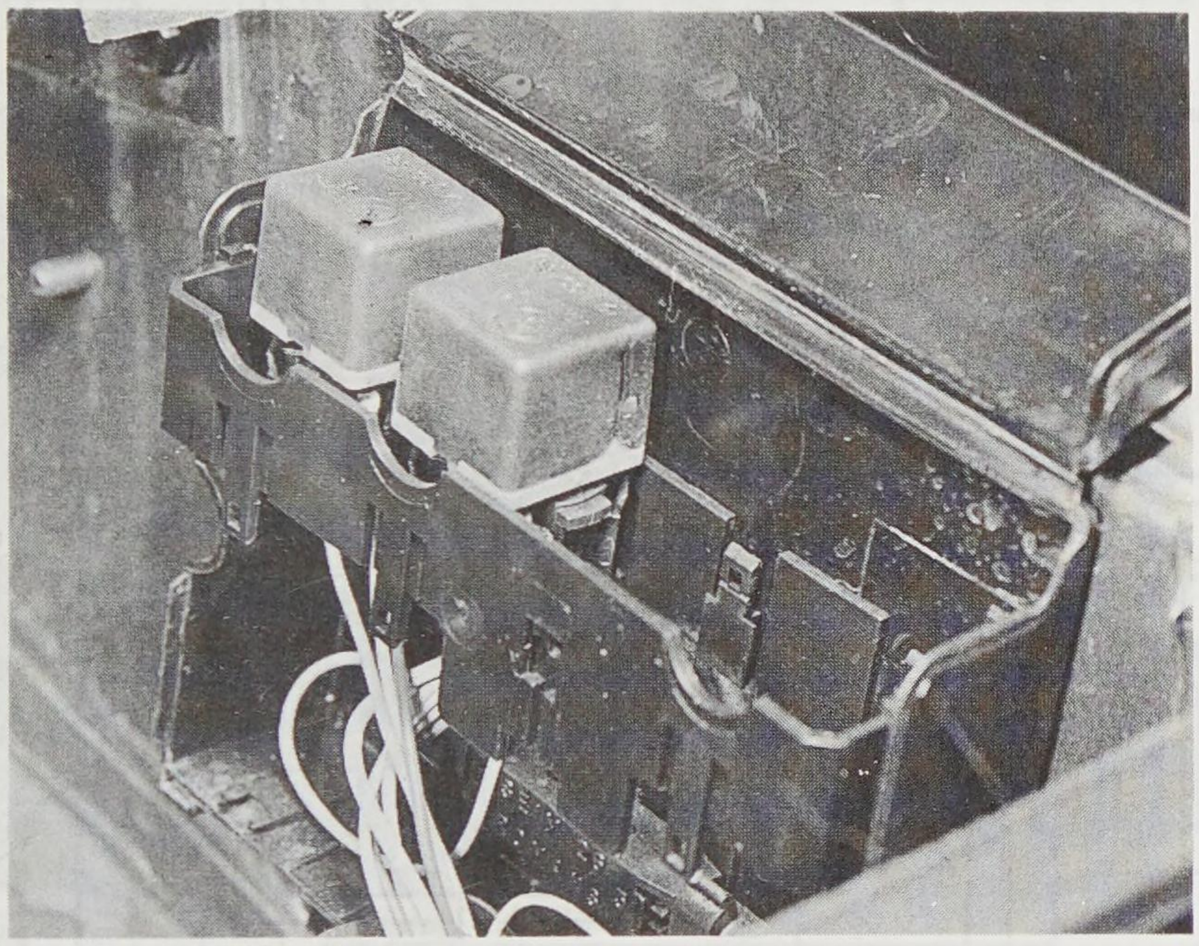
11.2 Fusebox retaining screw (arrowed)



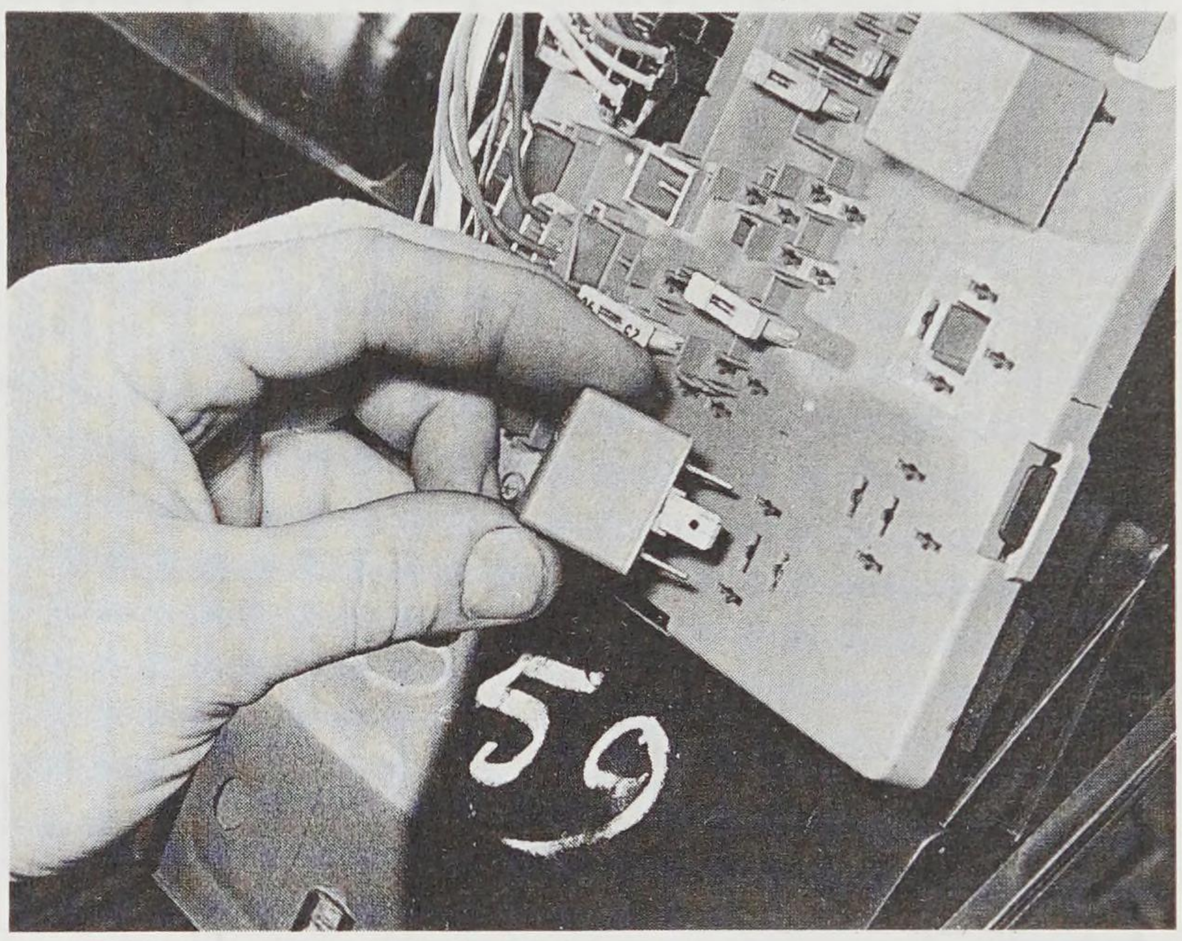
11.3A View of the fusebox



11.3B Removing a fuse



12.3 Relay box at left-hand end of scuttle



12.4 Fitting a relay to main fusebox

17 This last measure is also the best course of action if the drive end components are worn.
18 Reassembly is a reversal of removal, noting the following:

(a) Use a new gasket on the small end cover
(b) Fit the brush springs to their locating pegs in the end cover (photo)
(c) Do not forget the rubber seal between the motor and solenoid housings (photo)
(d) Apply high melting-point grease to the armature shaft bearings

11 Fuses

1 The fusebox is located under the facia to the right of the steering column.
2 To open the fusebox cover, turn the retaining screw (photo) a quarter turn and allow the cover to drop down.
3 The fuses are simply pulled from their holders (photos). Push the new fuse back into place.
4 Always renew a blown fuse with one of equal rating. Never bridge a fuse with silver paper or wire – it could lead to a fire.
5 A fuse which blows repeatedly or frequently should have the cause investigated.
6 The fuses contained in the fusebox are detailed in the Specifications, not all equipment being fitted to all models.
7 Certain other electrical circuits have in-line fuses.

12 Relays

1 The main relays are contained within the fusebox and are shown in Fig. 12.2.
2 Certain other systems contain their own relays and are detailed in the relevant Chapter/Section.
3 A further relay box mounted at the left-hand end of the scuttle contains the headlamp main beam relay and headlamp dim-dip system relay, and certain other relays and fuses according to model specification (photo).
4 To change a main relay, gain access to the relay compartment in the fusebox, then simply pull the relay from its socket. Refit by pushing the relay back into its sockets (photo).

13 Direction indicator/hazard warning flasher unit – general

1 The unit is located on the fuse board and controls both the direction indicator and hazard warning functions.
2 In the event of either system not operating, or one lamp flashing very quickly, carry out the following checks before renewing the flasher unit itself.
3 Inspect the circuit fuse and renew it if it is blown.
4 Check the condition of all wiring and the security of the connections.
5 Check the lamp which is malfunctioning for a broken bulb.

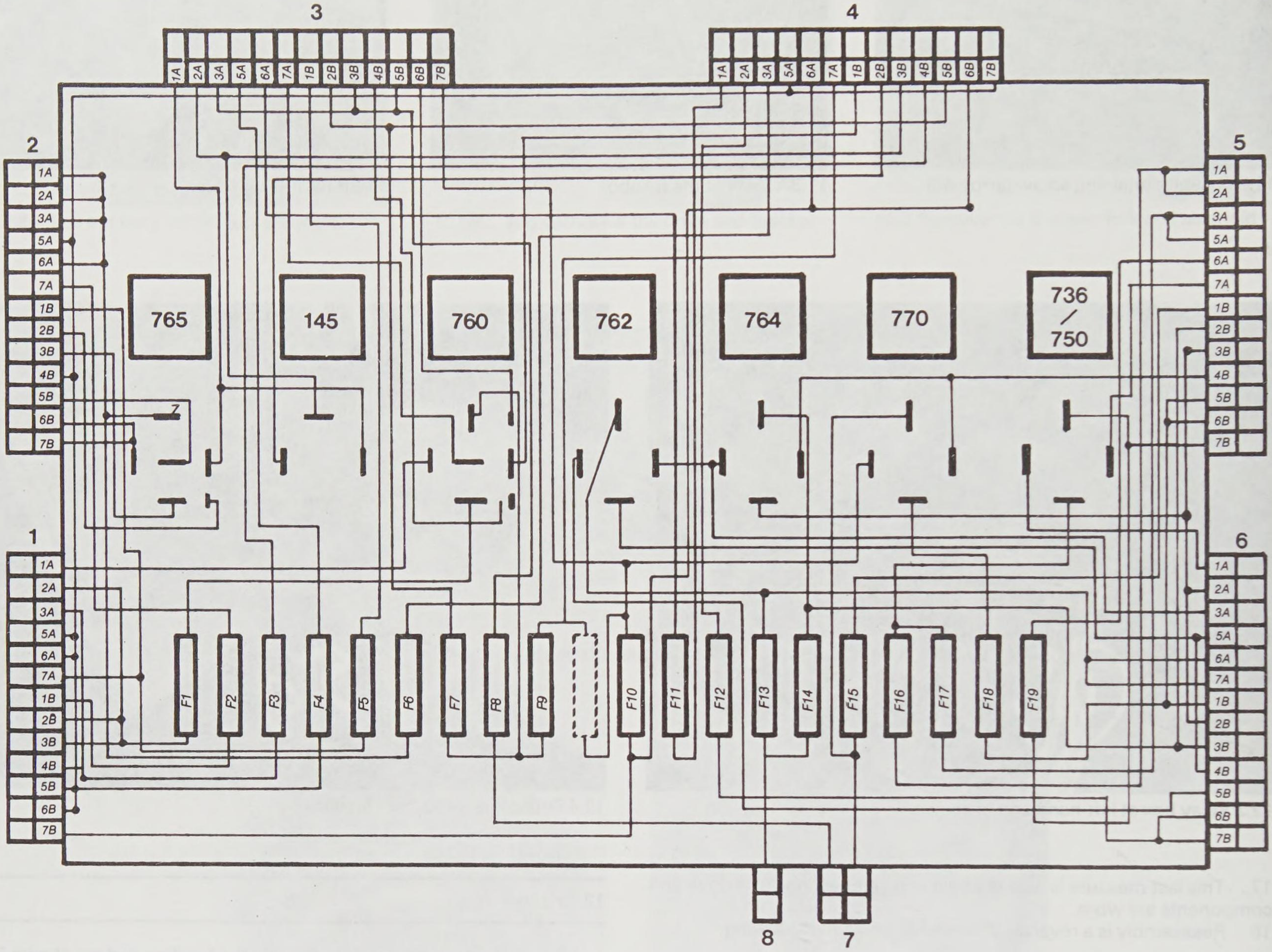


Fig 12.2 Showing relays in the fusebox (Sec 12)

145	*Direction indicator flasher unit*	*764*	*Sunroof tilt and central locking relay*
736/750	*Driving lamp and front foglamp relay*	*765*	*Windscreen wiper relay*
760	*Heater rear window relay*	*770*	*Accessories relay*
762	*Front electric window relay*		

6 Make sure that the lamp casing or bulb earth connecting is making a good contact.

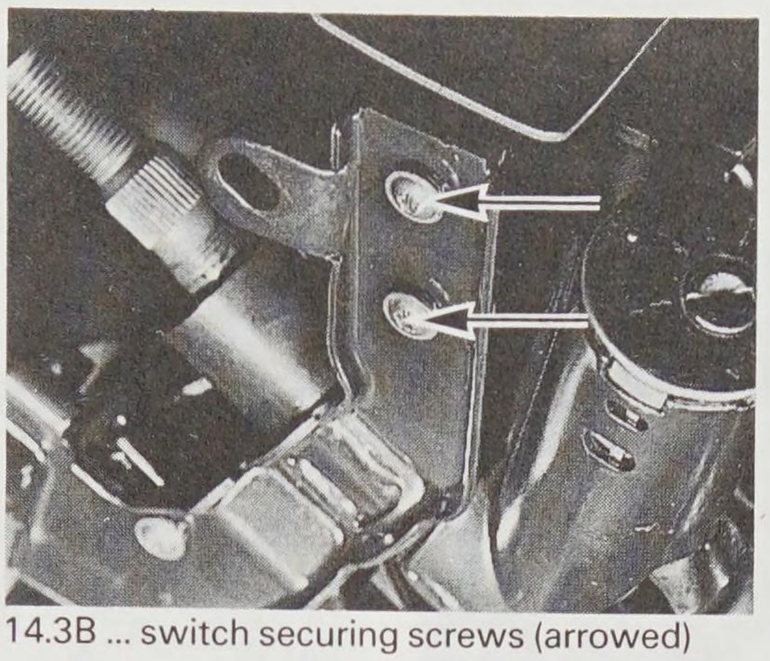
14 Steering column combination switches – removal and refitting

1 Disconnect the battery negative terminal.
2 Remove the steering column shroud panels as described in Chapter 10.
3 Remove the screws securing the switch to the steering column brackets (photos).
4 Withdraw the switch and disconnect the electrical connector (photo).
5 Refit in reverse order.

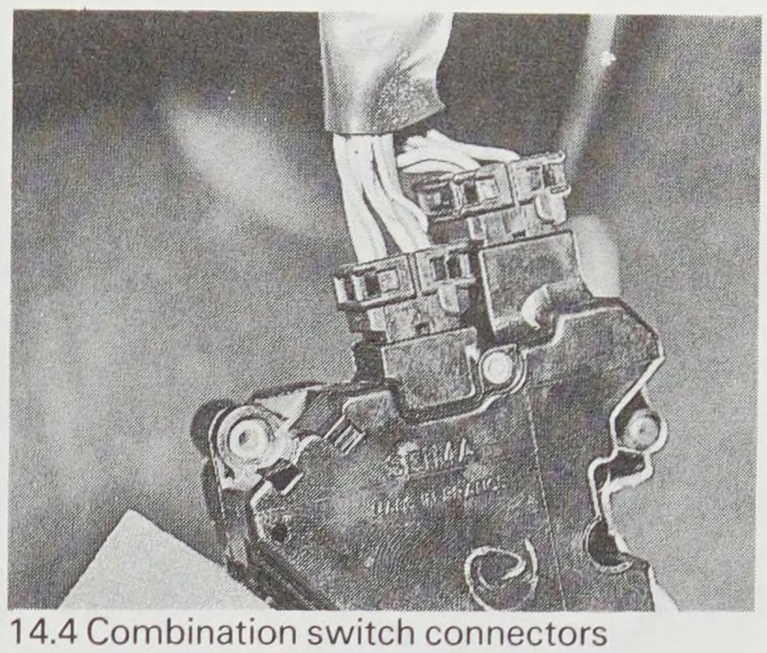
15 Facia-mounted switches – removal and refitting

1 Carefully prise out the switch against the tension of the plastic retaining tabs.
2 Disconnect the wiring or multi-plug, noting the fitted location, and remove the switch (photo).
3 Refitting is a reversal of removal.

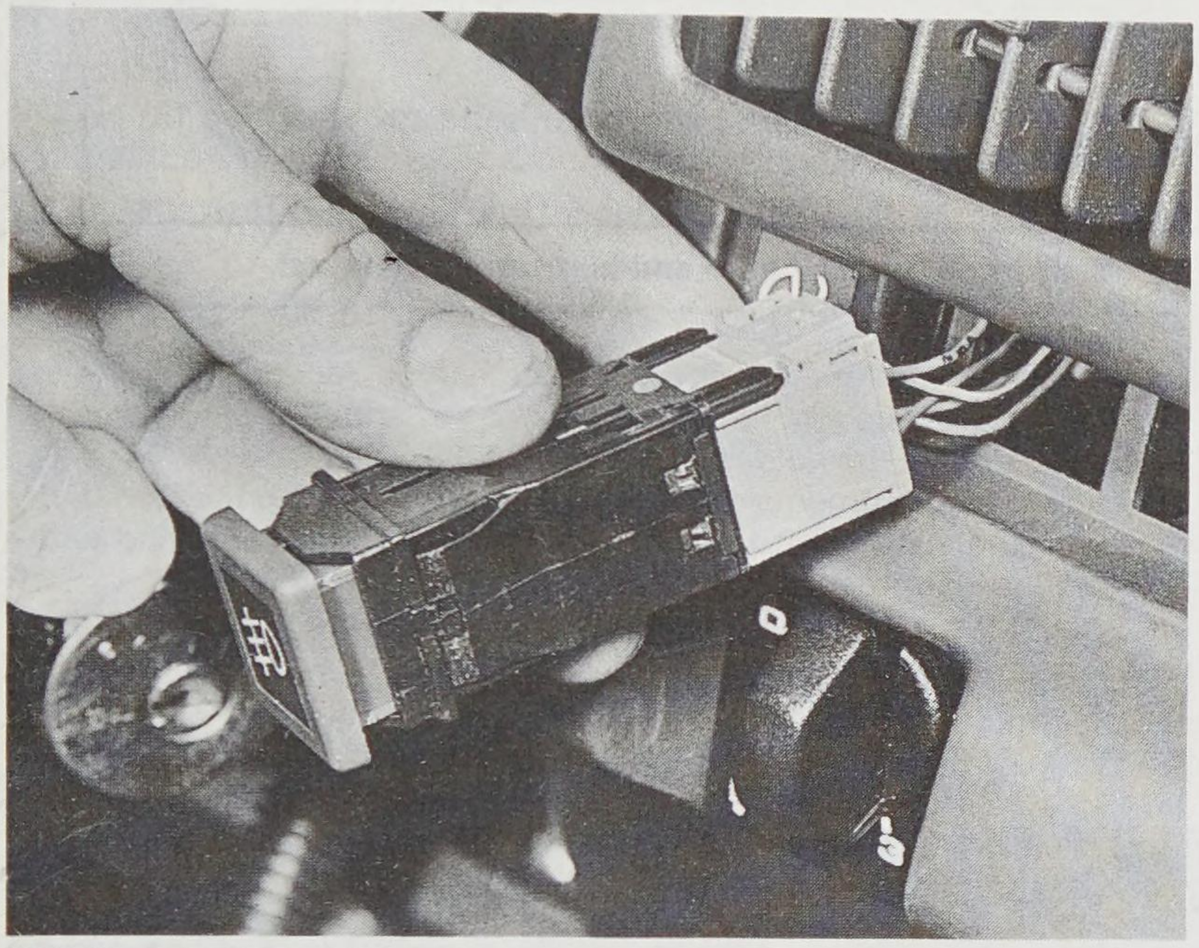
14.3A Steering column combination ...



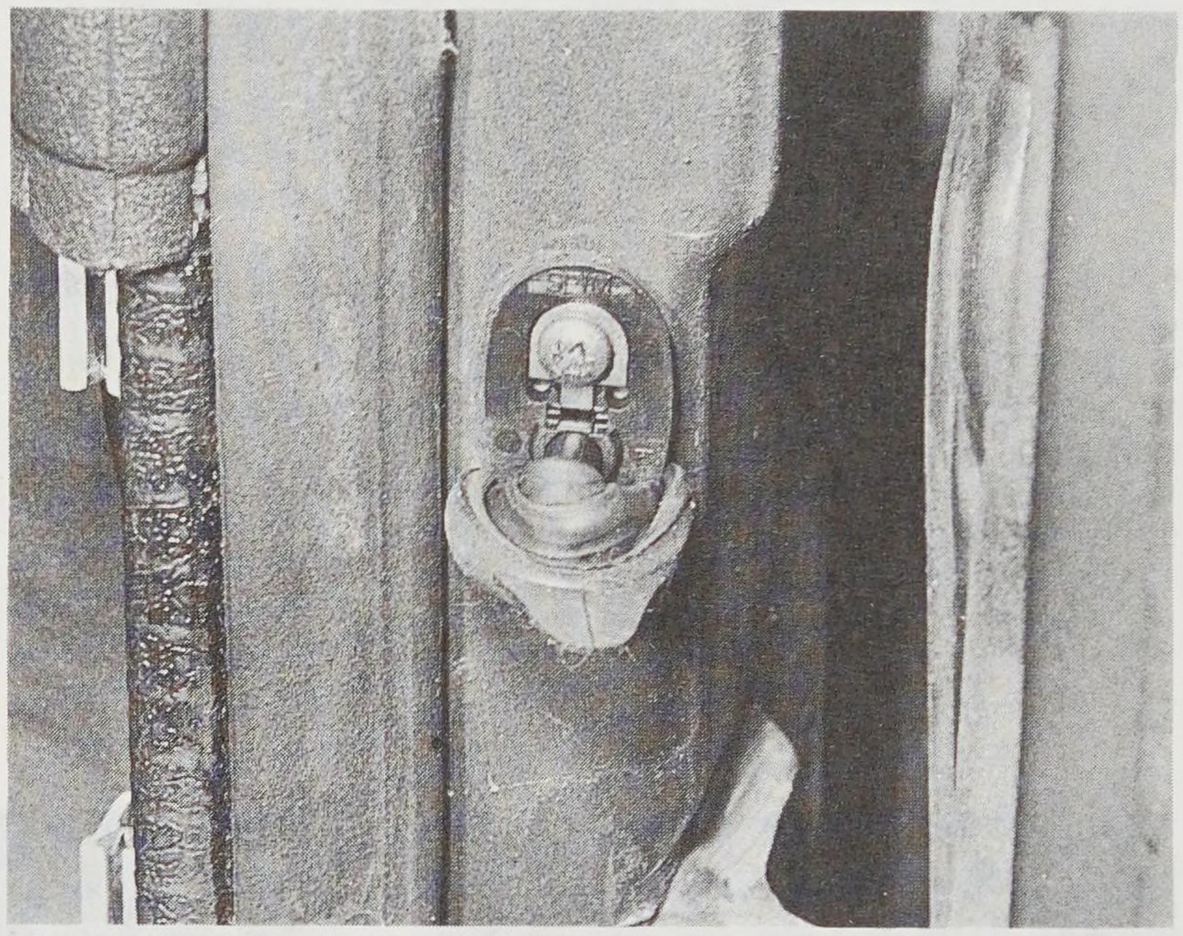
14.3B ... switch securing screws (arrowed)



14.4 Combination switch connectors



15.2 Facia switch multi-plug



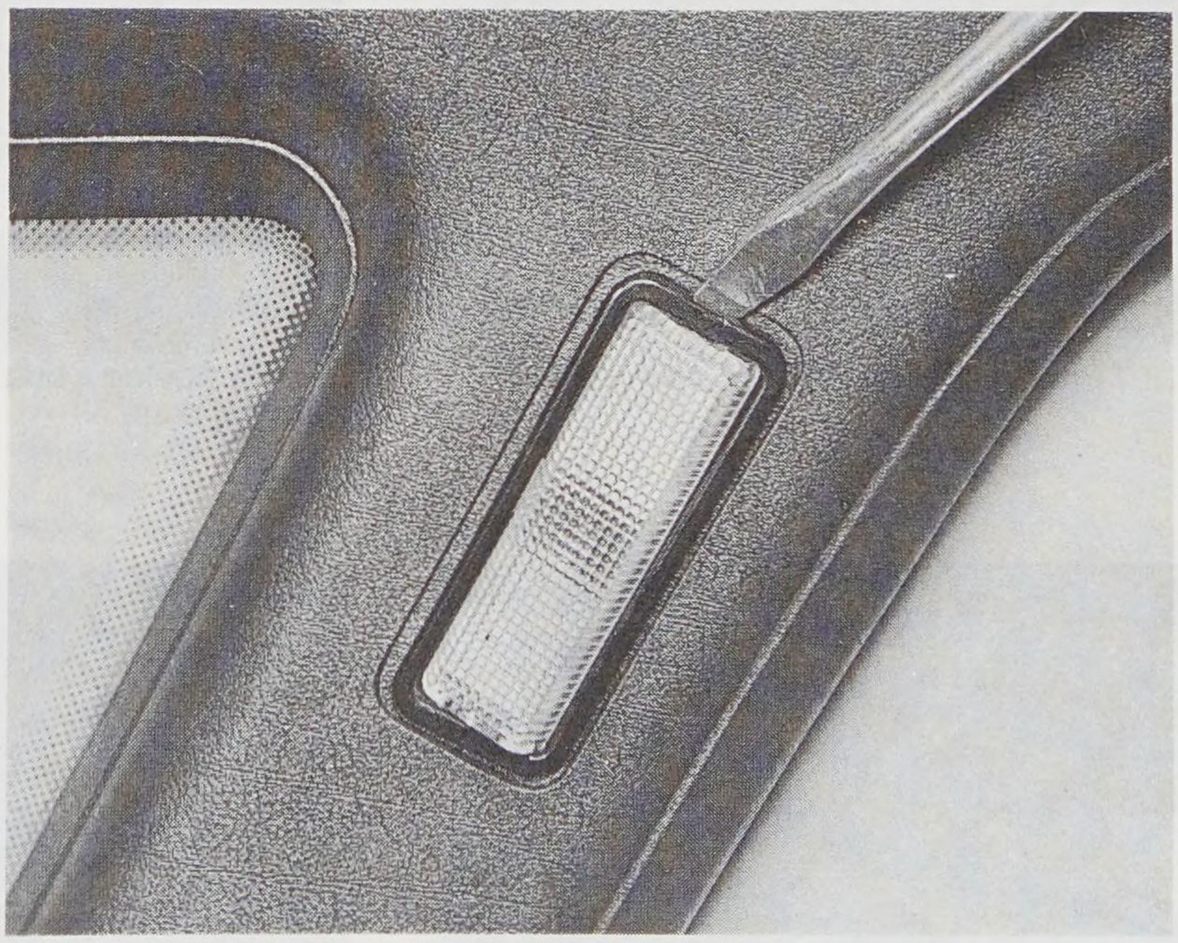
16.1 Door courtesy lamp switch

16 Door courtesy lamp switches – removal and refitting

1 Disconnect the battery negative terminal, then remove the screw securing the switch to the door pillar (photo).
2 Prise the switch from the pillar and disconnect the leads.
3 Tape the leads to the pillar to prevent them being lost inside the double skin.
4 Refit in reverse order.

17 Interior courtesy lamps – removal and refitting

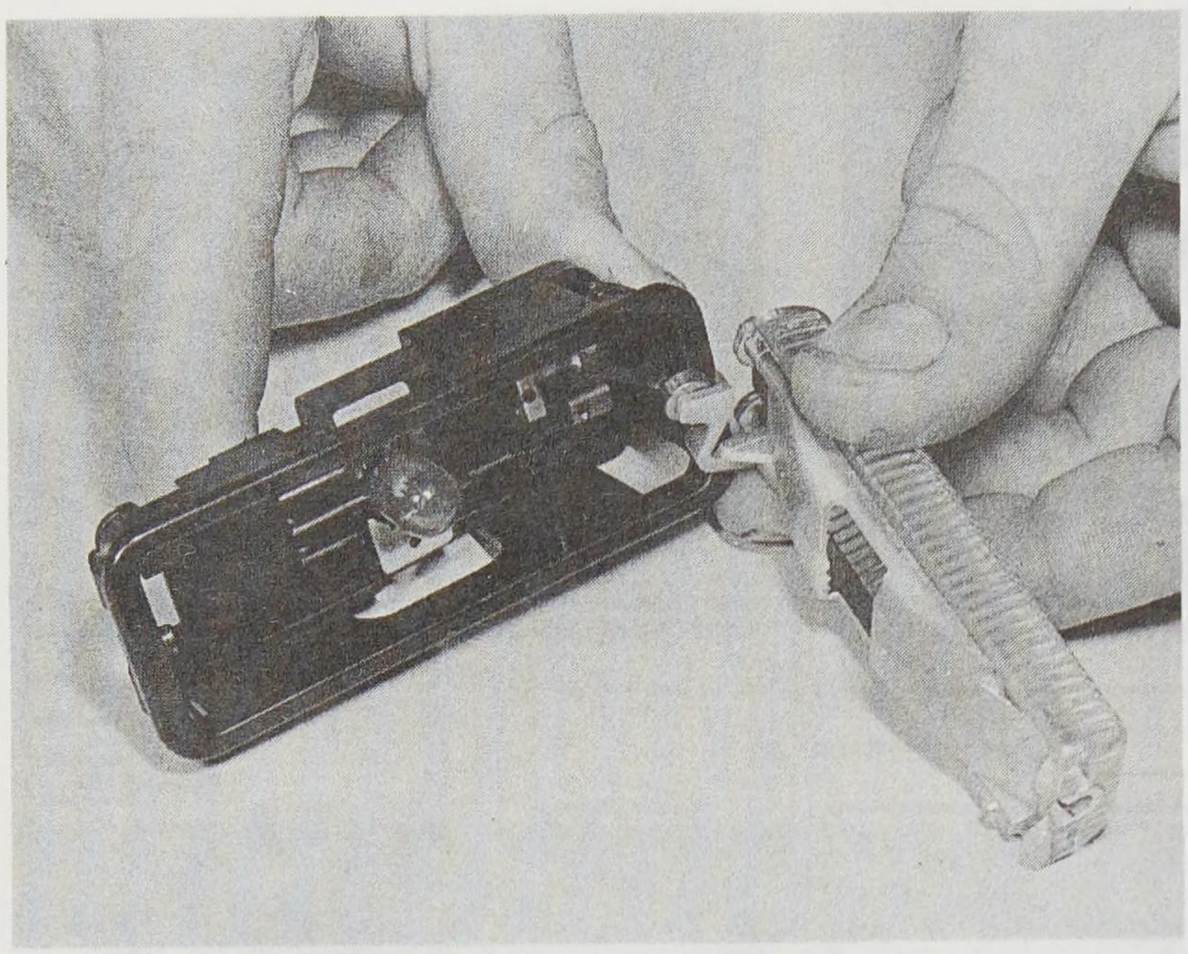
1 All interior courtesy lamps are of the same design and removed and refitted in the same way.
2 Disconnect the battery negative terminal, then prise out the unit from its housing in the trim panel (photo).
3 Disconnect the leads and remove the unit.
4 To renew the bulb, prise out the lens, and the bulb, which is a push-fit in the unit, can be removed (photo).
5 Refit in reverse order.



17.2 Prising out a courtesy lamp

18 Instrument panel – removal and refitting

1 Disconnect the battery negative terminal.
2 Prise out the three blanking plates from the front of the instrument panel using a small screwdriver (photo).
3 Remove the bolts under the blanking plates (photo and Fig. 12.3) and lift off the instrument panel visor.
4 Move the steering column to its lowest position.
5 Pull off the headlamp beam adjuster control knob (photo).
6 Remove the securing screws and withdraw the right-hand facia panel (photo).
7 Disconnect the switches, or remove them as described in Section 15.



17.4 Prise off the lens to gain access to the bulb

8 Remove the right-hand screw securing the centre facia panel (photo).
9 Remove the top screws from the instrument panel (photo).
10 Tilt the instrument panel forward and disconnect the speedometer cable as described in Section 20.
11 Disconnect the electrical multi-plugs, taking careful note of their fitted positions.
12 Lift out the instrument panel.
13 Refitting is a reversal of removal.

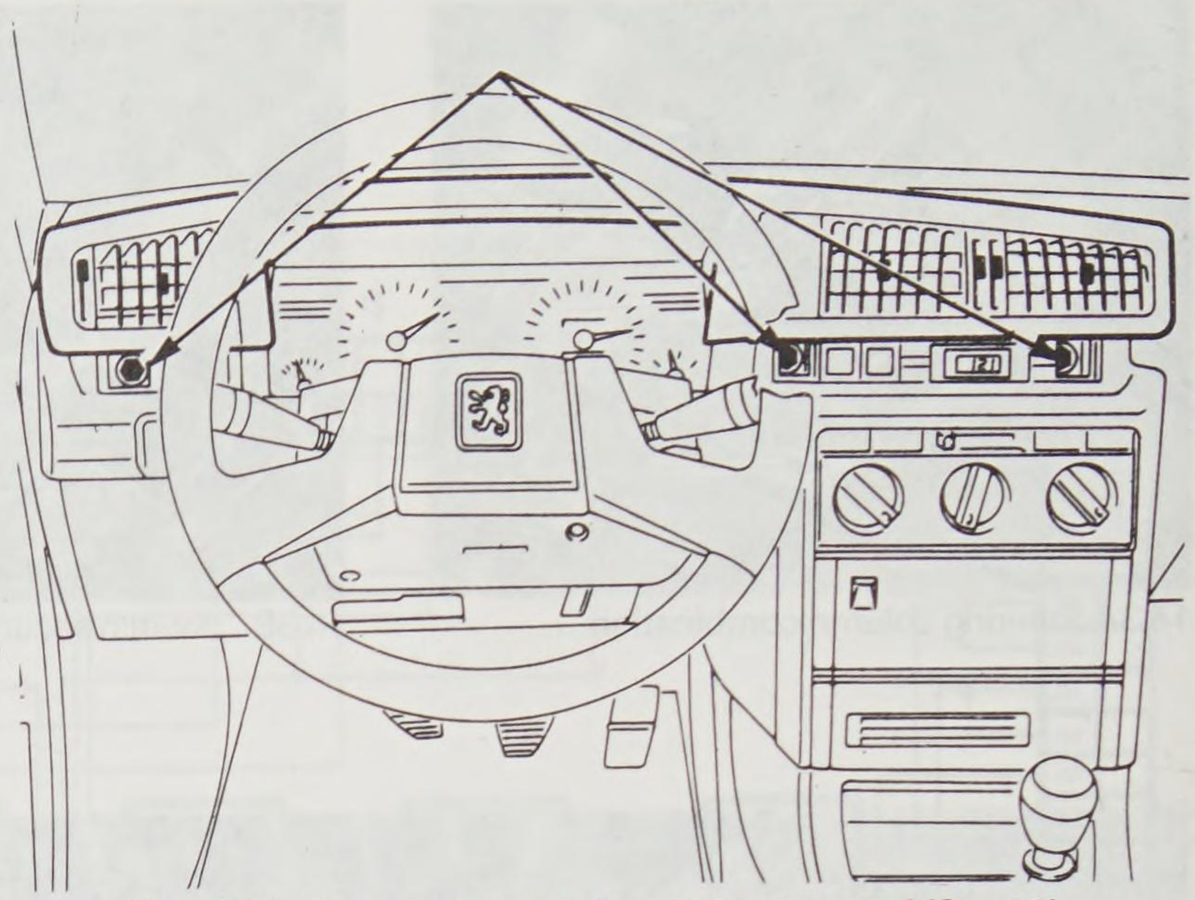
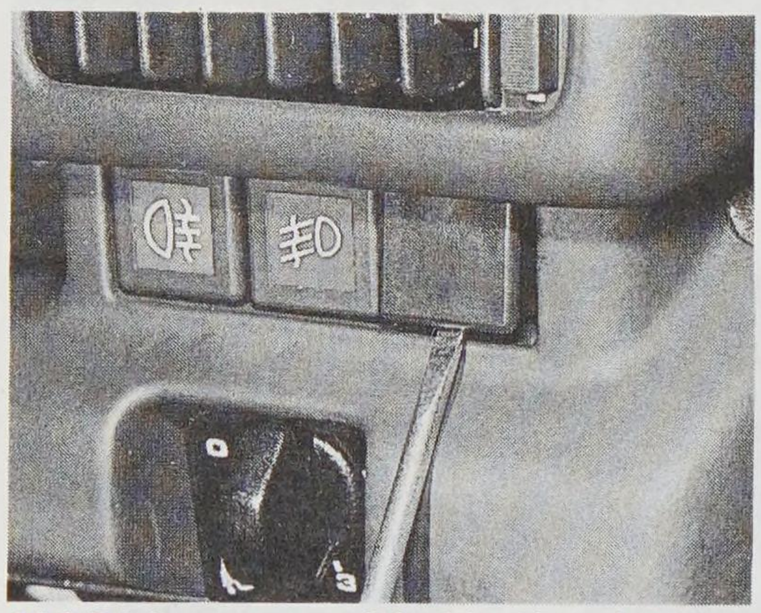


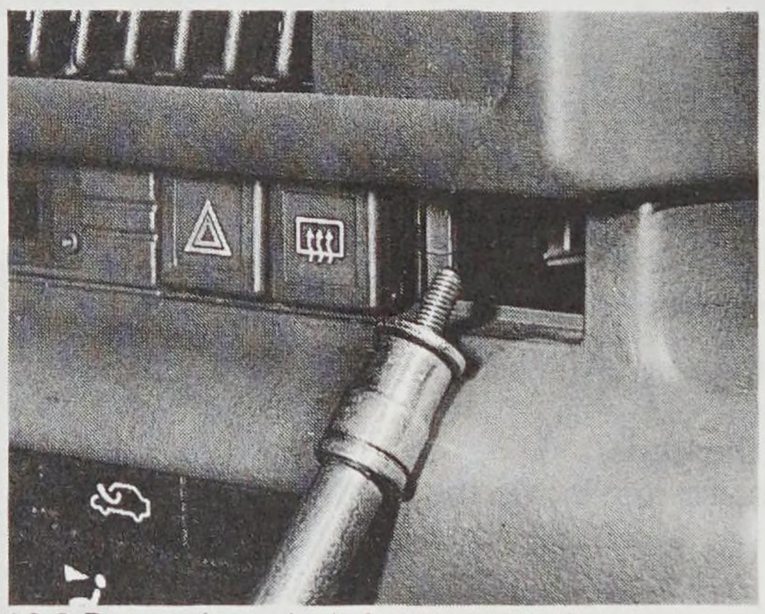
Fig 12.3 Instrument panel visor bolts arrowed (Sec 18)

19 Instrument panel – bulb and instrument renewal

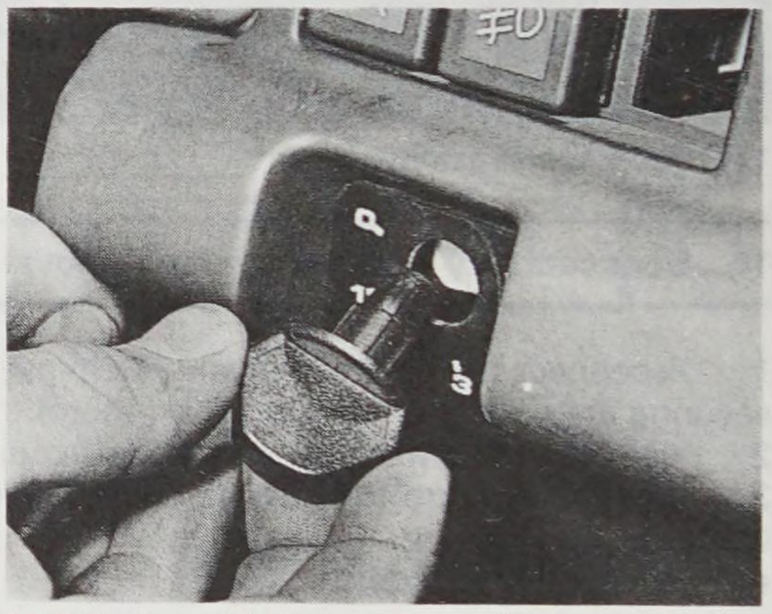
1 Remove the instrument panel as described in Section 18.
2 The bulbholders are a bayonet fix in the instrument panel, and the bulbs a push-fit in the holder (photo).
3 Individual instruments can be renewed by removing the front lens, removing the instrument fixings from the rear of the panel and withdrawing the instruments. Refit in reverse (photo).
4 Should the printed circuit become damaged, remove all the instruments and renew the printed circuit board.



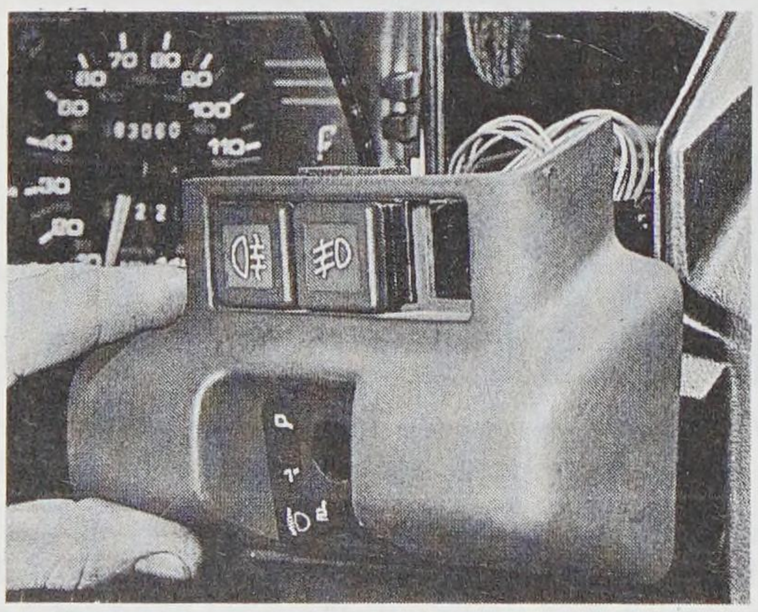
18.2 Prising out one of the blanking plates



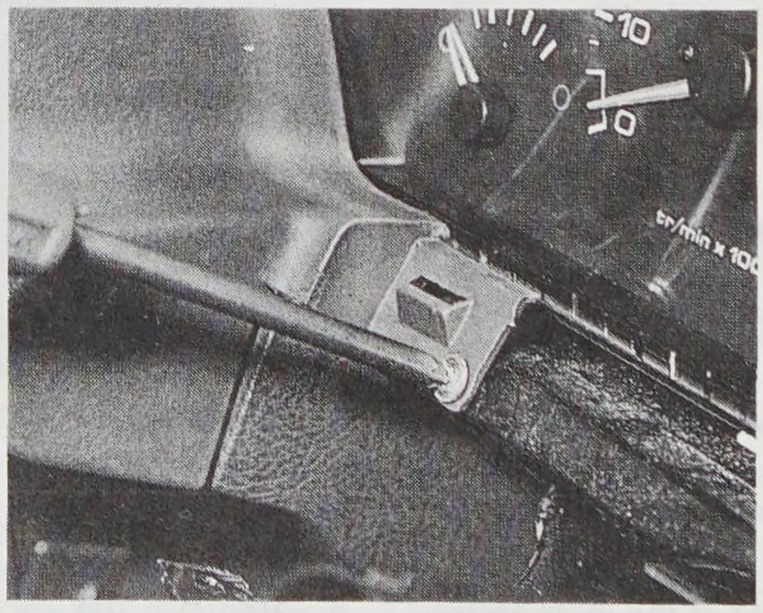
18.3 Removing a bolt from under the blanking plate



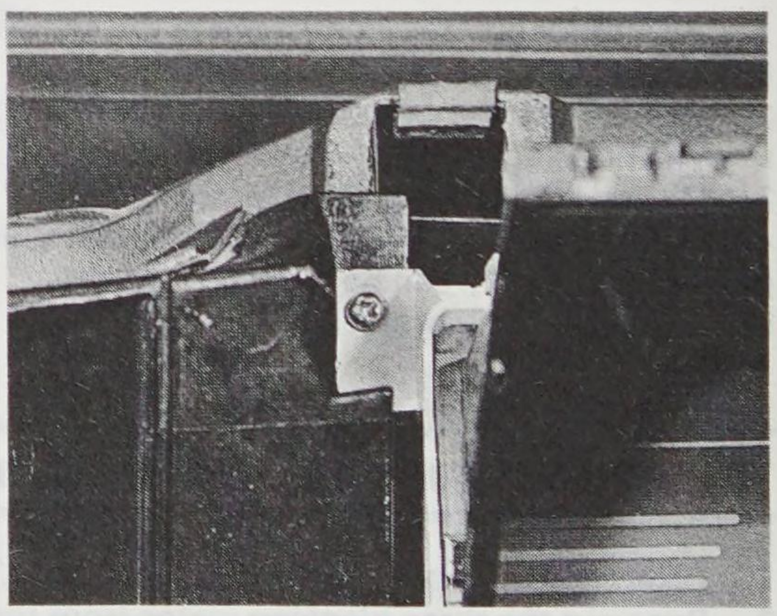
18.5 Pulling off the headlamp beam adjuster control knob



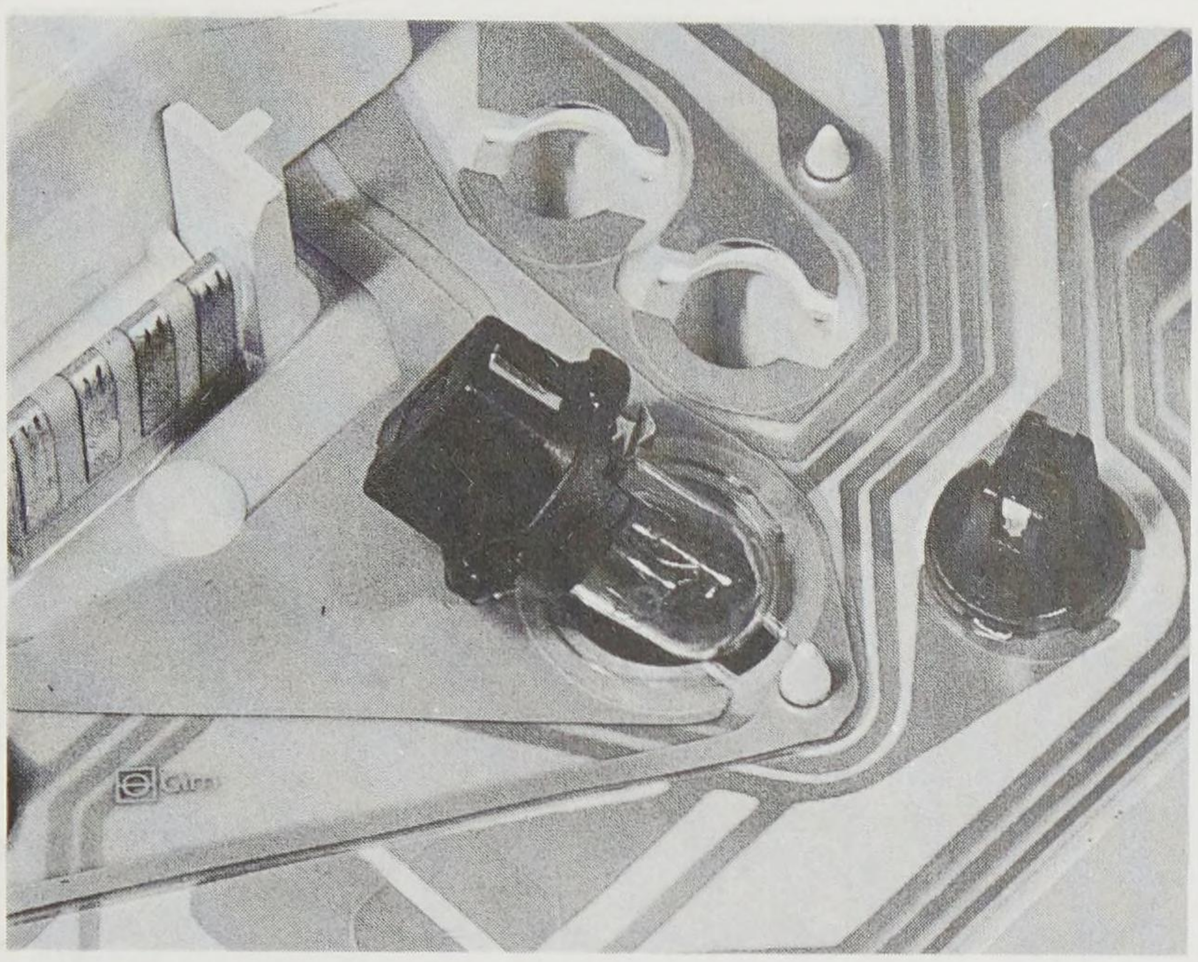
18.6 Withdrawing the right-hand panel



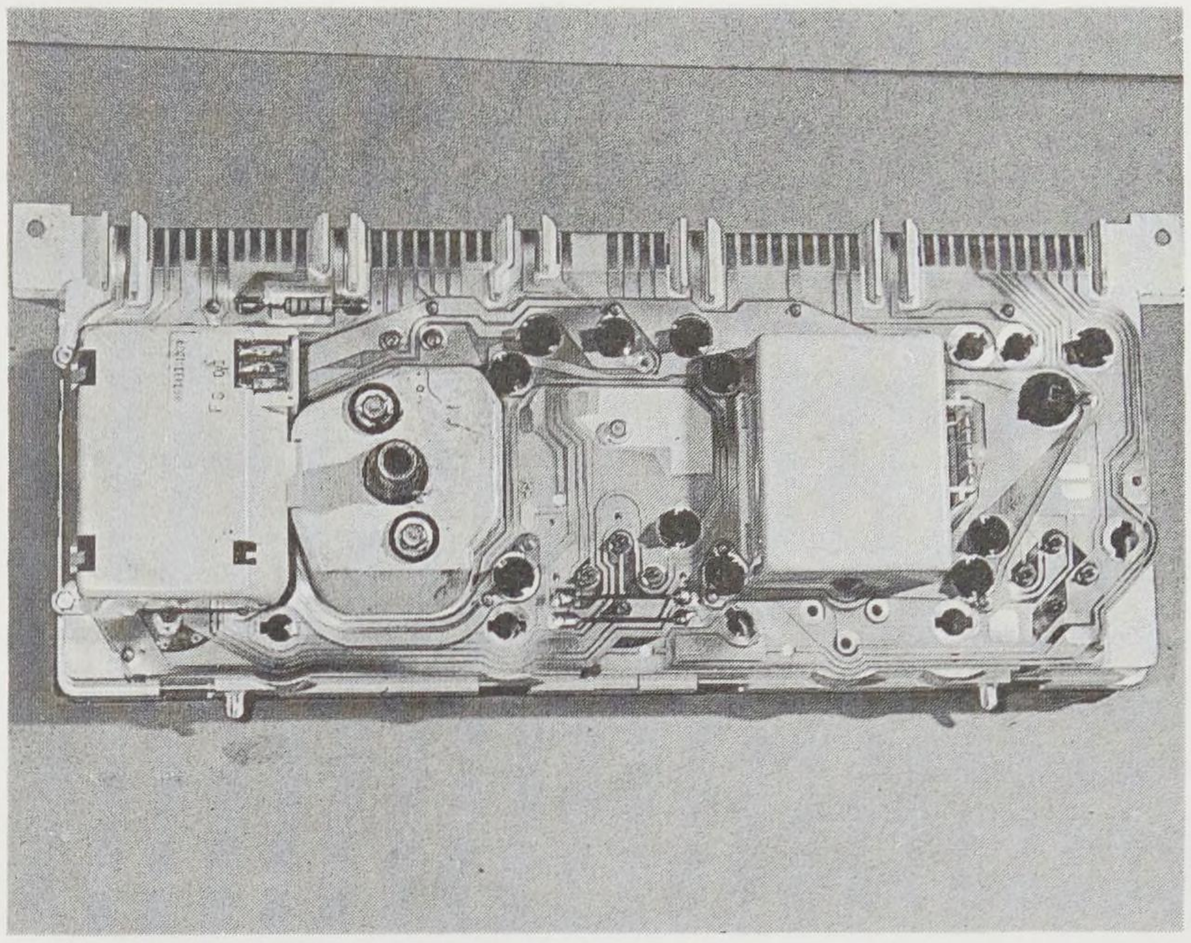
18.8 Central panel retaining screw



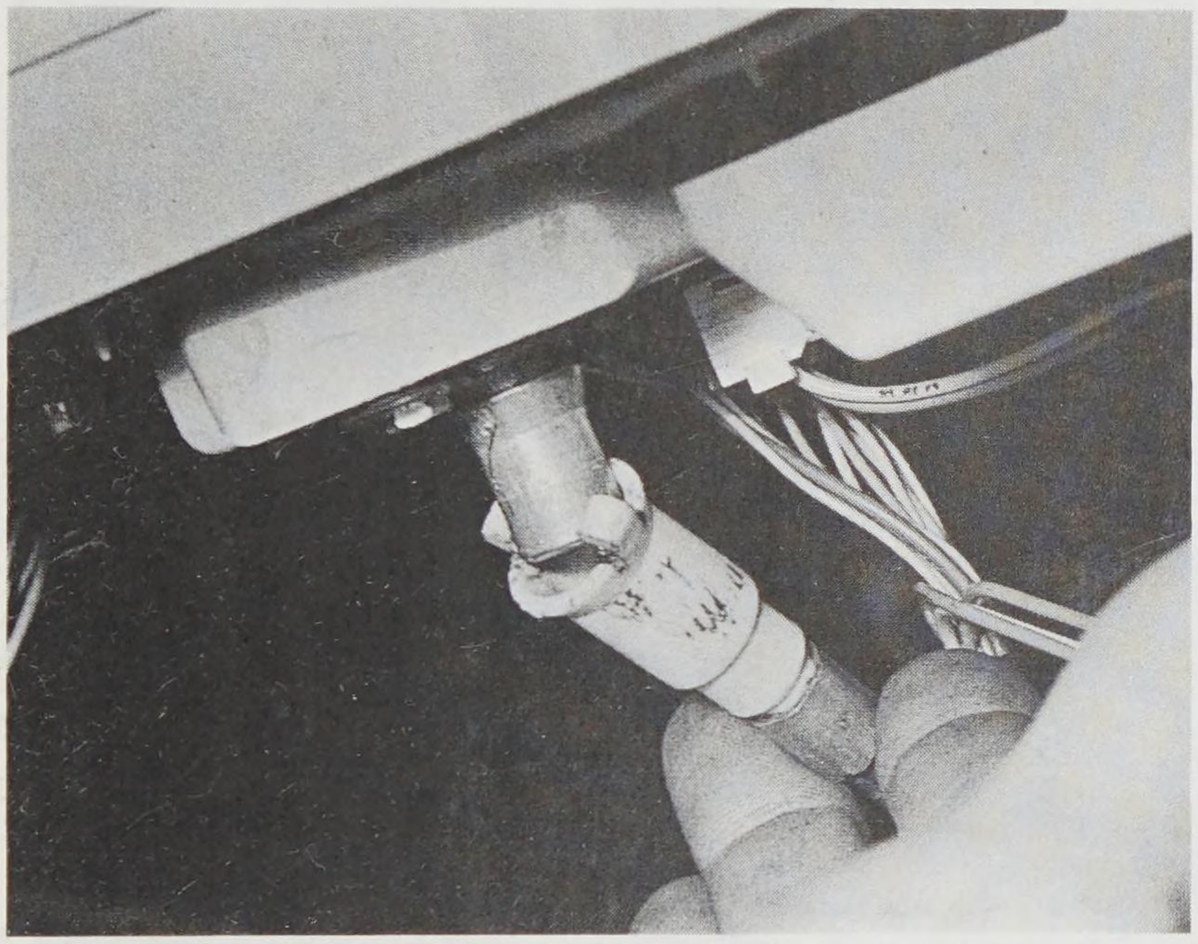
18.9 Instrument panel top screw



19.2 Instrument panel bulb and holder



19.3 Rear view of instrument panel



20.4 Disconnect the speedometer cable from the instrument panel

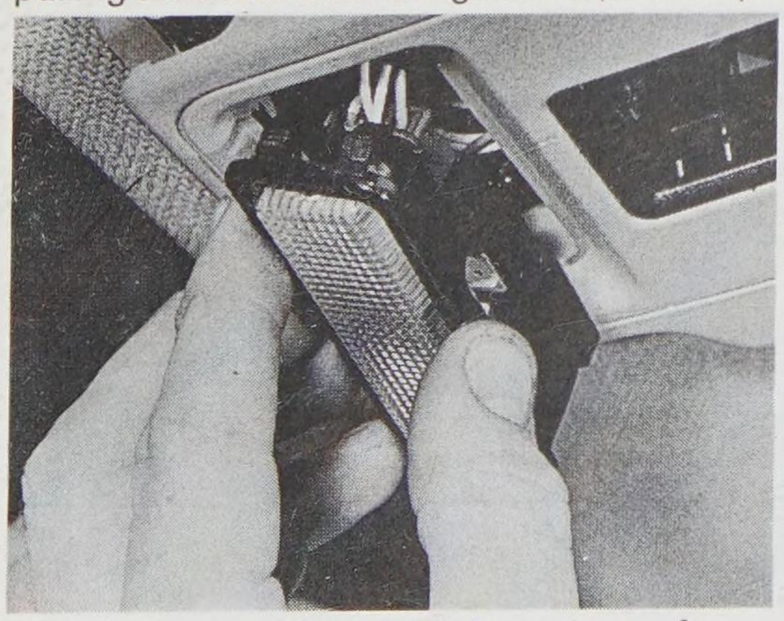
20 Speedometer cable – removal and refitting

1 Disconnect the battery negative terminal.
2 Gain access to the rear of the instrument panel with reference to Section 19.
3 Disconnect the gearbox end of the cable by removing the pin and pulling the cable from the gearbox (see Chapter 6, Section 6).
4 Disconnect the cable at the instrument panel by grasping the end of the cable, holding the instrument panel, and giving the cable a sharp tug (photo).
5 Feed the cable through the grommet in the bulkhead into the engine compartment.
6 Refit in reverse order, ensuring the grommet is not dislodged.

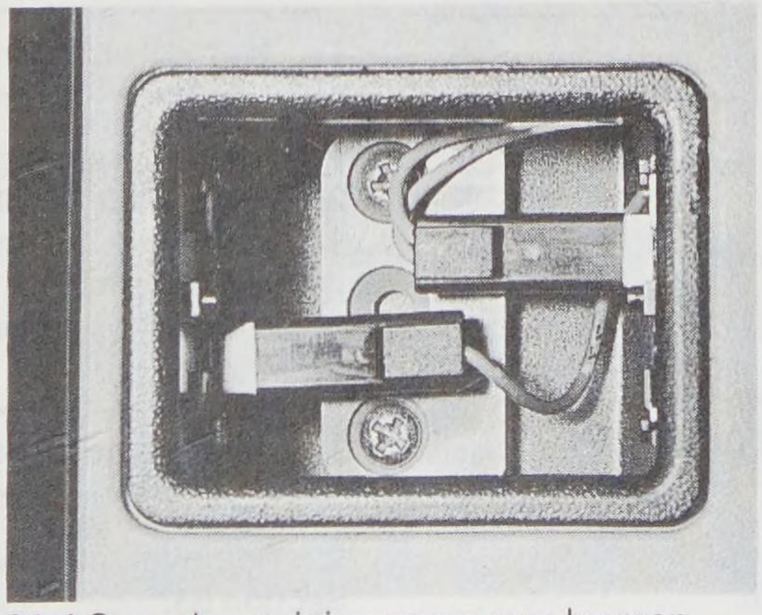
21 Sunroof console – removal and refitting

1 Disconnect the battery negative terminal.
2 Unclip the sun visors from each side of the console.
3 All the lamp units, switches and instruments contained within the console can be prised out (photo). These vary according to vehicle specification.
4 The console retaining screws are under the map reading lamp (photo).
5 The map reading lamp is of the festoon type, held between two spring contacts (photo).
6 To remove the console, prise out the map reading lamp, remove the console retaining screws, disconnect the electrical leads and remove the console (photo).
7 Refit in reverse order.

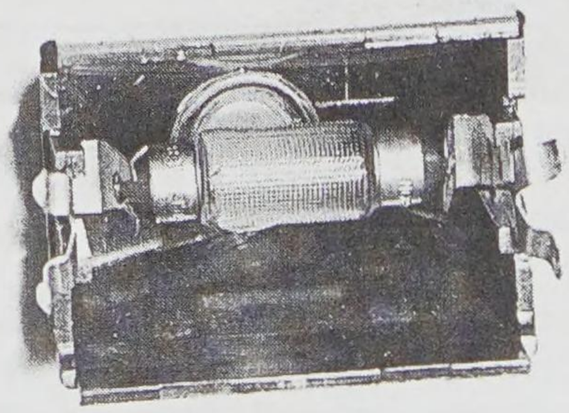
Note: *For details of the central locking infra-red control unit refer to Chapter 11, Section 36.*



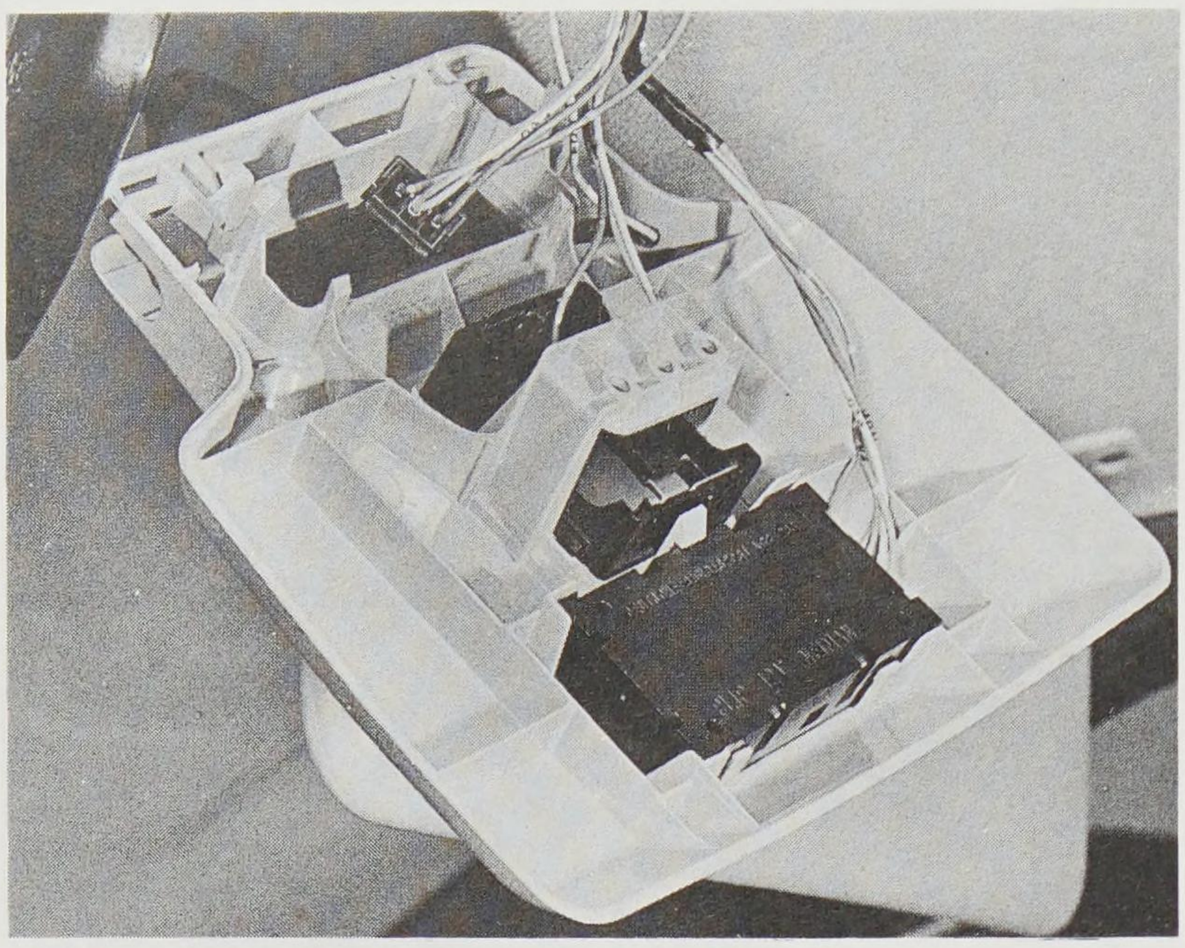
21.3 Removing a lamp unit from the roof console



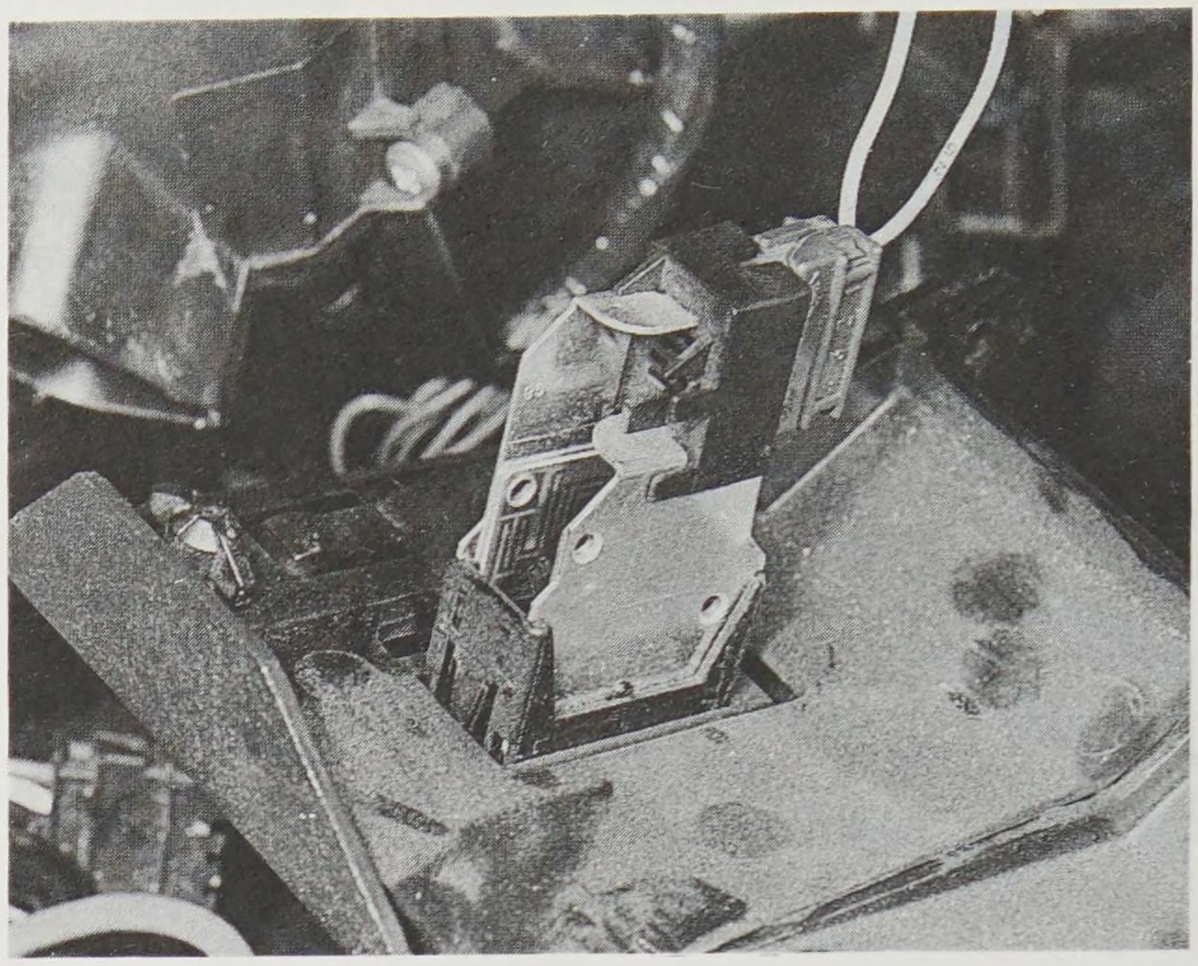
21.4 Console retaining screws under map reading lamp



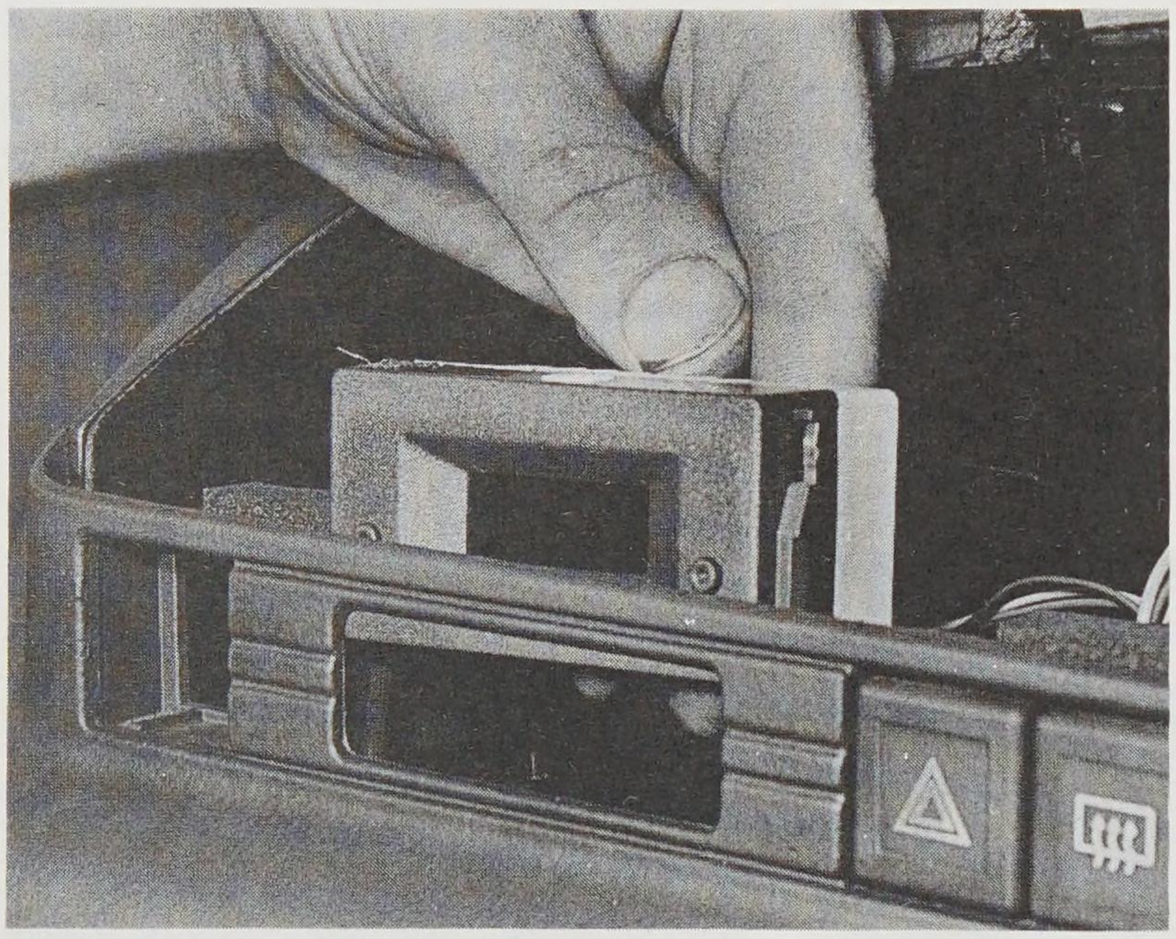
21.5 Map reading lamp festoon bulb



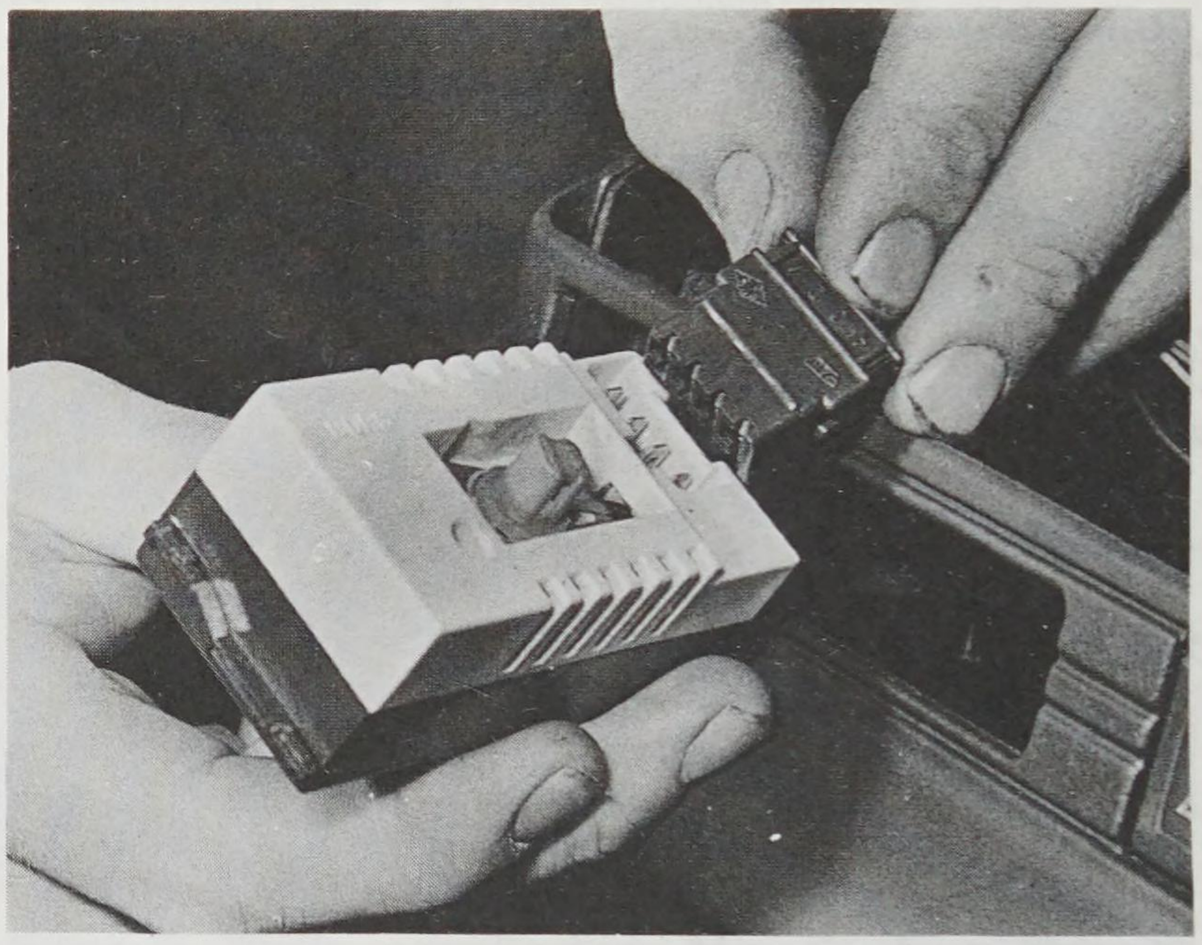
21.6 Electrical connections on underside of console



22.2 Rear view of rheostat



23.2 Pulling out the digital clock ...



23.3 ... and disconnecting the plug

22 Rheostat (lighting) – removal and refitting

1 Lower the fusebox cover as described in Section 11.
2 Disconnect the plug from the back of the rheostat (photo).
3 Depress the plastic clips and push the unit from the fusebox cover.
4 Refit in reverse cover.

23 Digital clock – removal and refitting

1 Remove the instrument panel visor as described in Section 18.
2 Pull out the digital clock (photo).
3 Disconnect the electrical plug and remove the clock (photo).
4 Refit in reverse order.

24 Cigar lighter and ashtray lamp – removal and refitting

Front

1 Prise out the trinket box from the centre console.
2 Remove the floor console side panels.
3 Working through these apertures, disconnect the cigar lighter and lamp (photo).
4 The lamp is clipped in position and the cigar lighter is removed by depressing the clips (photo) and pushing it from the console.
5 Refit in reverse order.

Rear

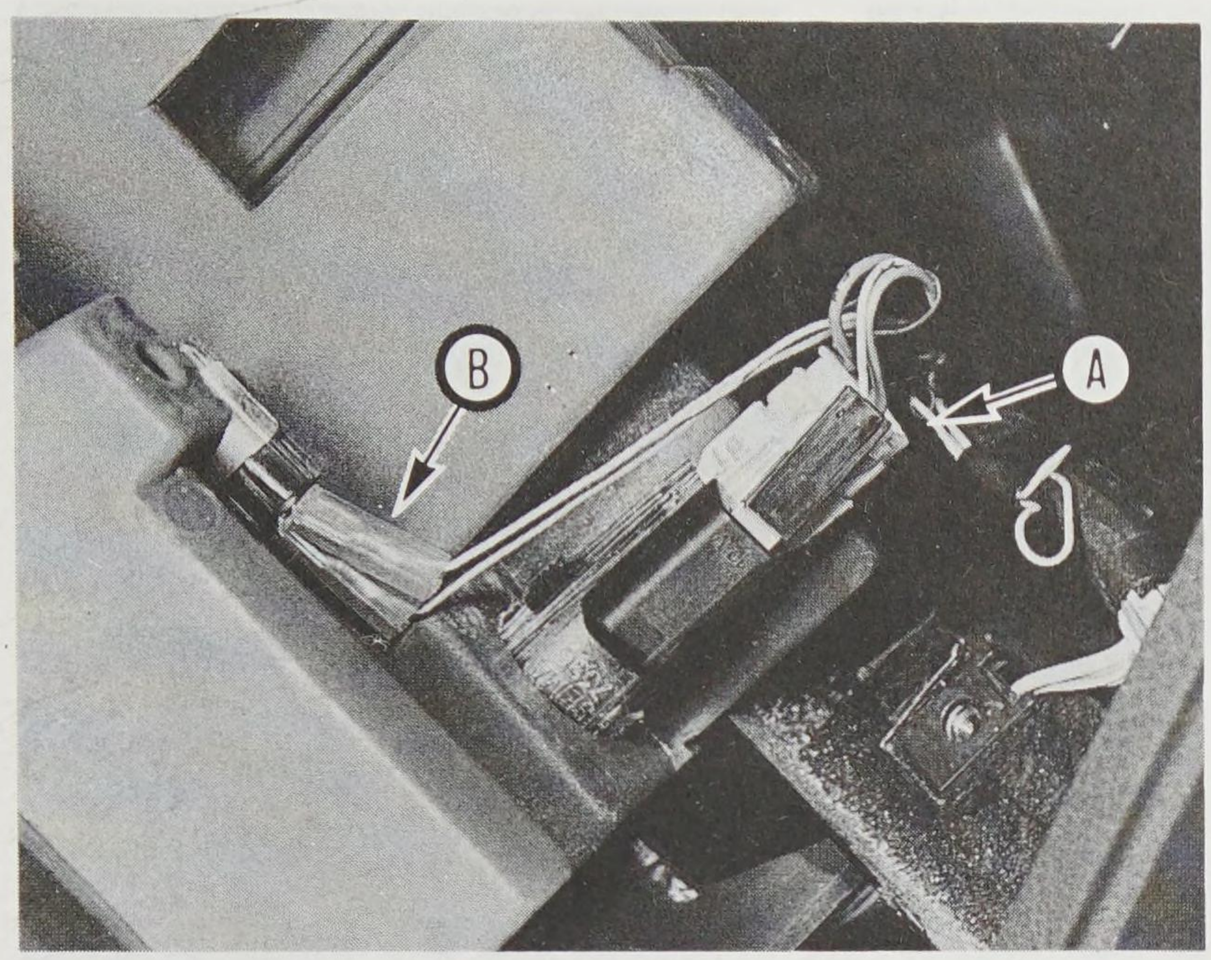
6 The procedure is similar, gaining access to the lighter by removing the rear ashtray.

25 Horn – removal and refitting

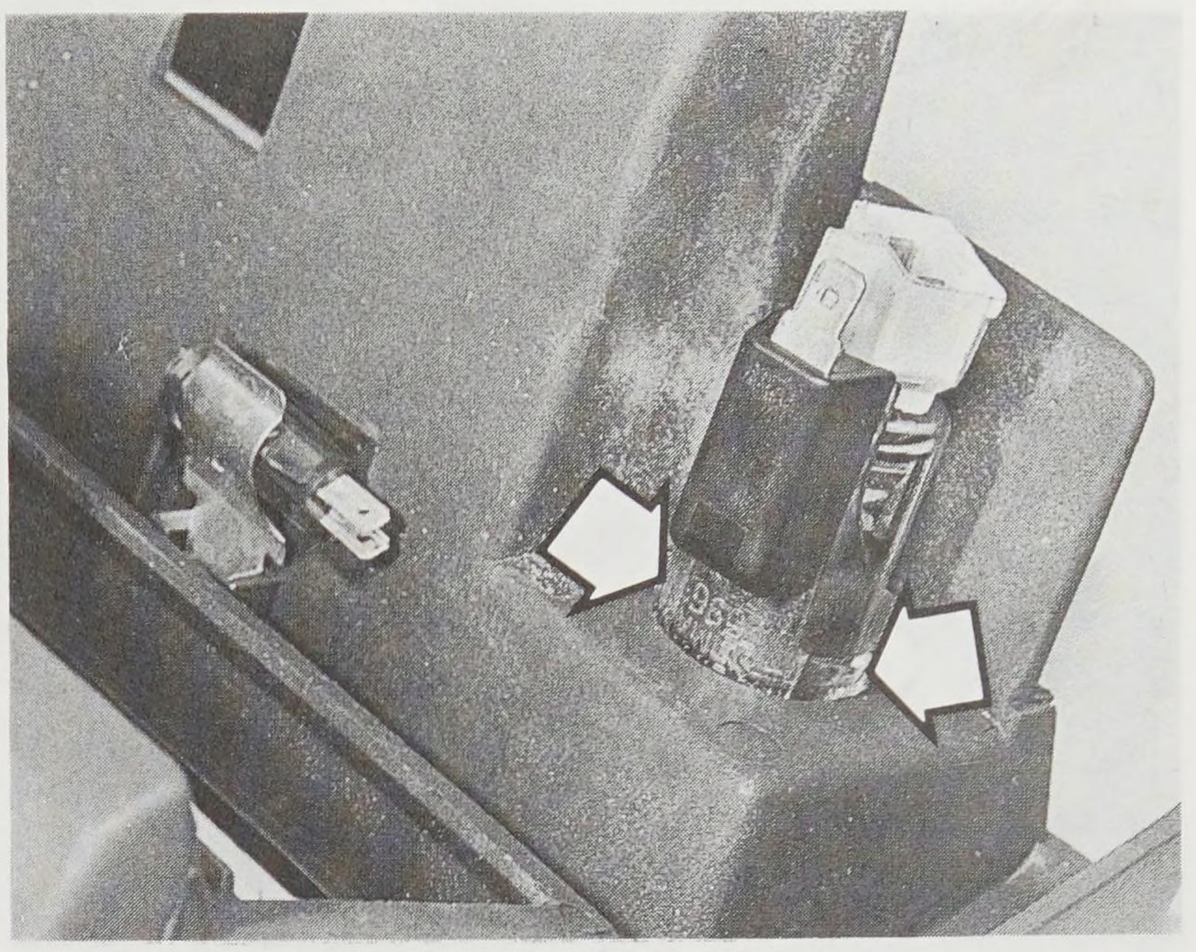
1 The horns are mounted under the front bumper (photo).
2 Disconnect the electrical leads to the horn.
3 Undo the nut securing the horn to the mounting bracket and withdraw the horn.
4 Refit in reverse order.

26 Heater control illumination bulb – renewal

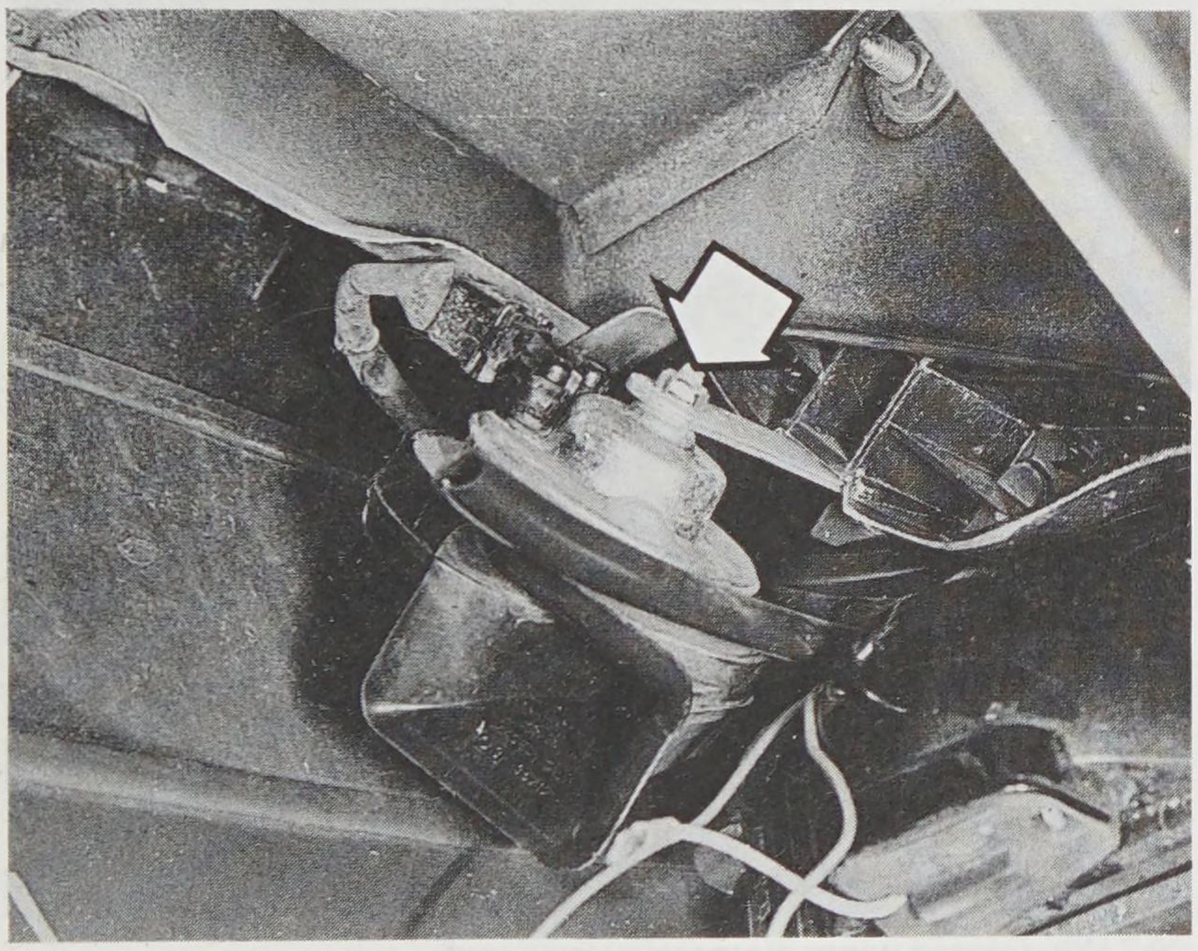
1 Remove the heater control panel as described in Chapter 11, Section 53.
2 The bulb(s) are a bayonet fix in their holders and can be removed using snipe-nosed pliers (photo).
3 Refit the panel in reverse order.



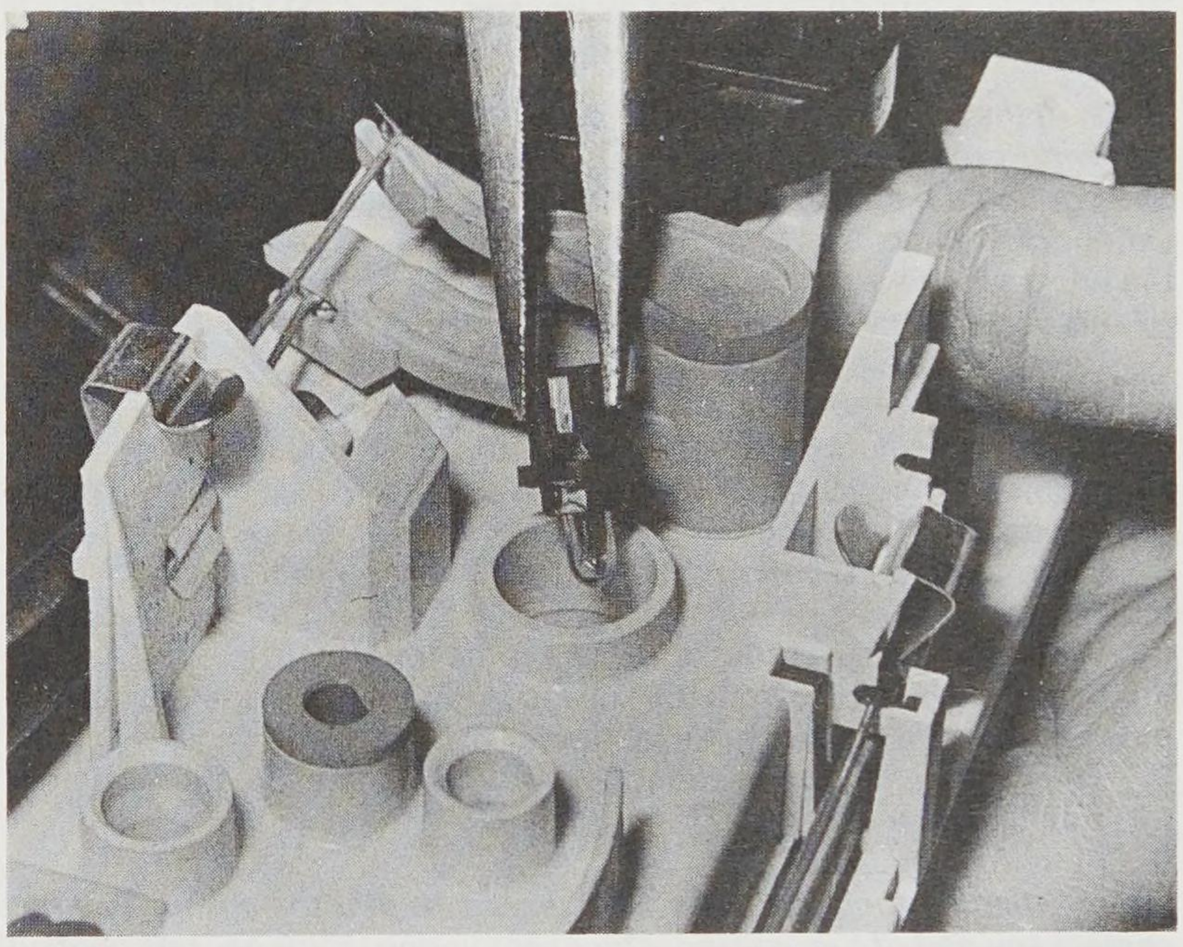
24.3 Rear view of cigar lighter showing lighter connections (A) and bulb (B)



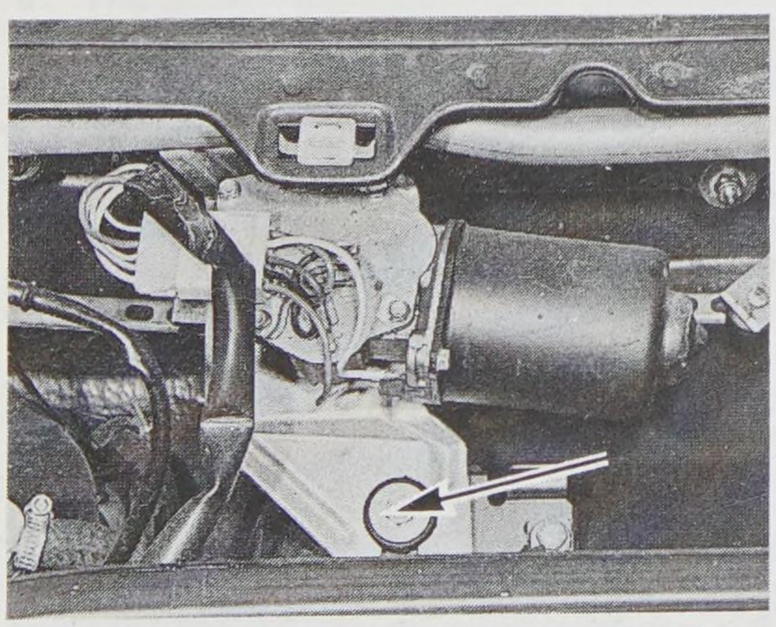
24.4 Depress the clips (arrowed) to remove the lighter



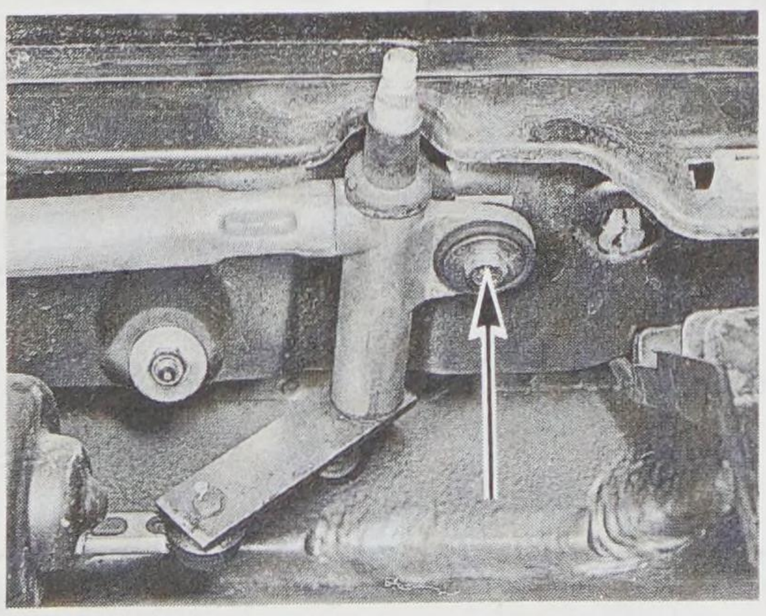
25.1 View of the horn showing mounting nut (arrowed)



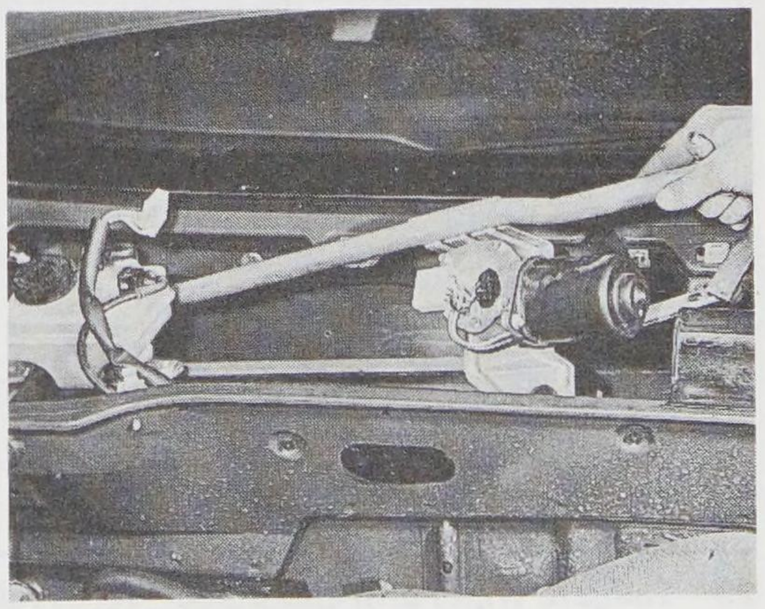
26.2 Removing a heater control illumination bulb



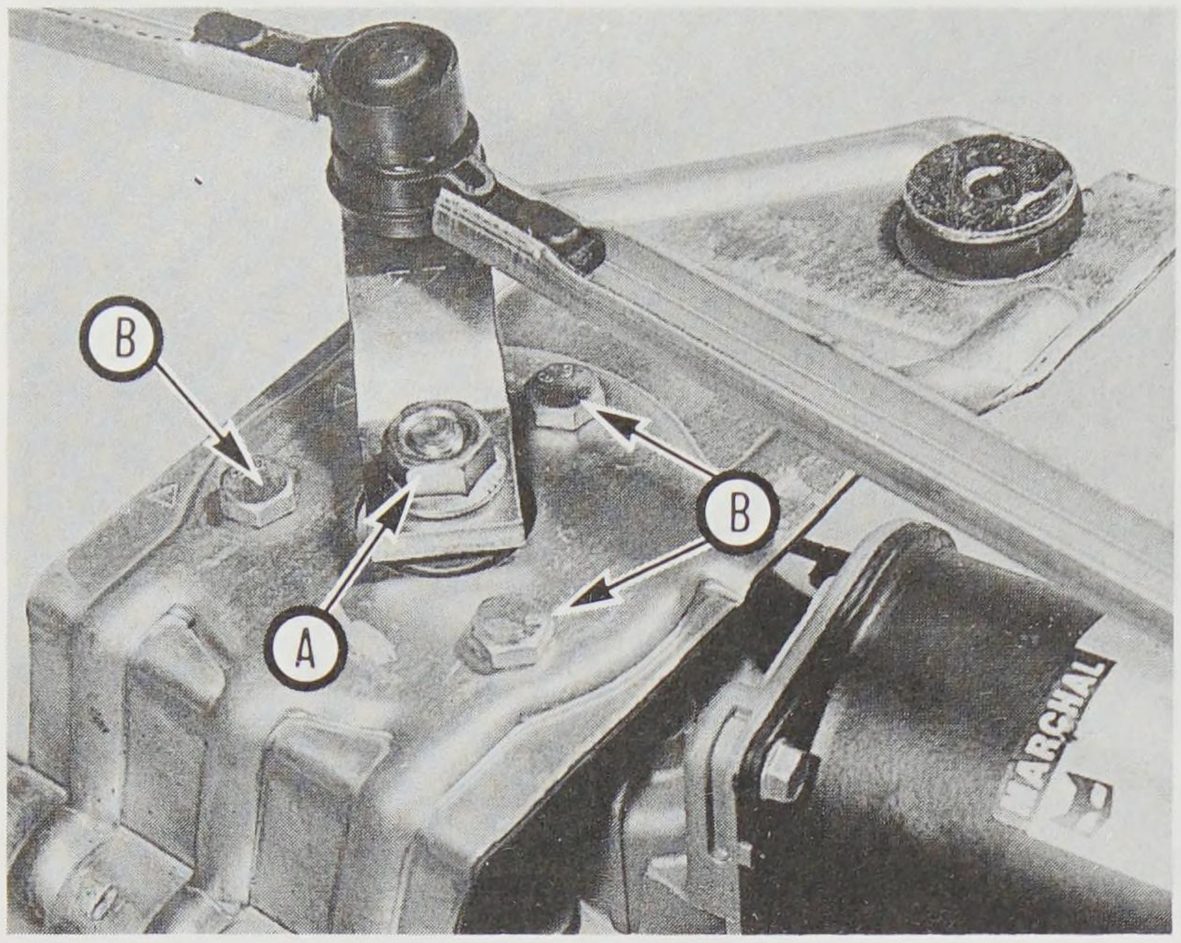
27.5A Undo the nuts (arrowed) securing the motor ...



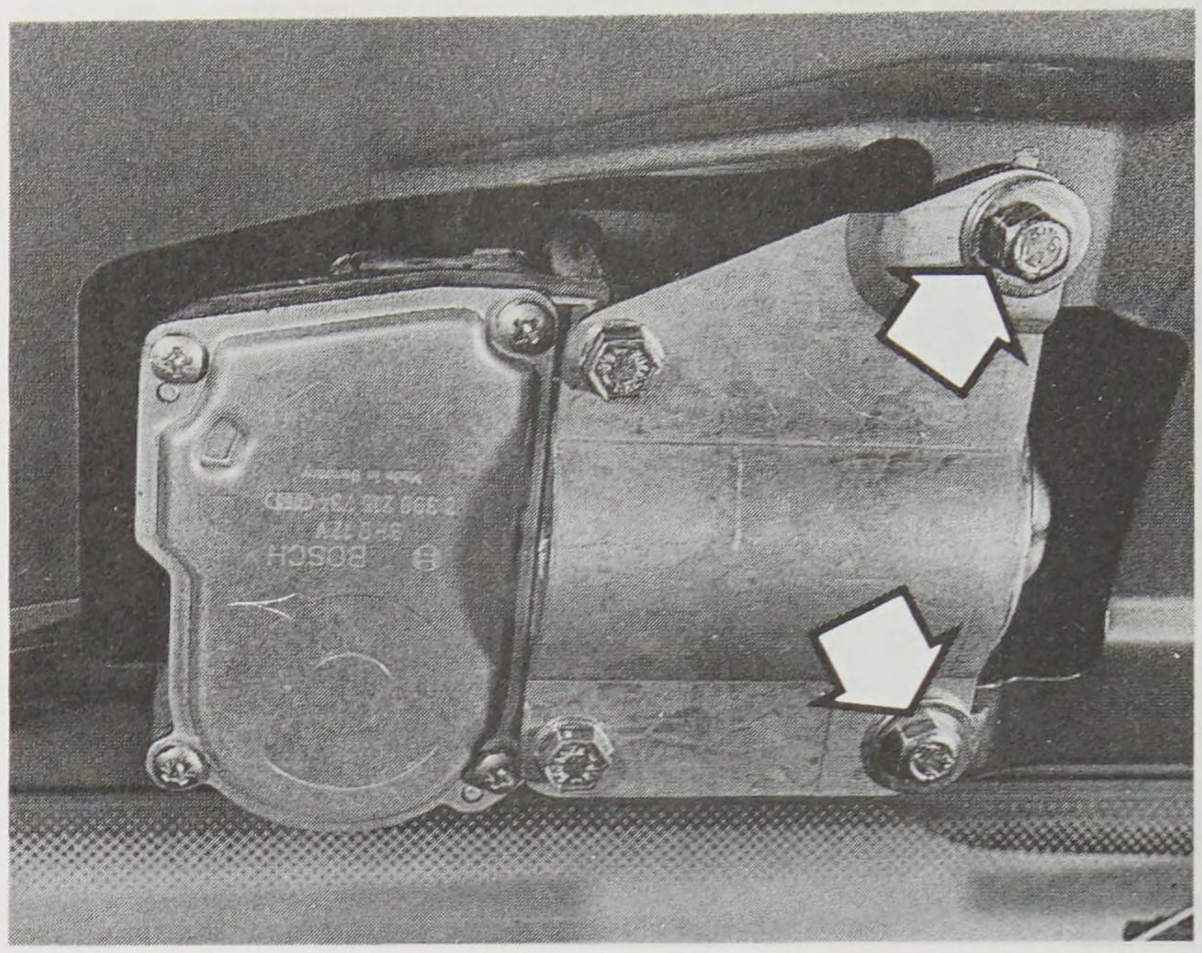
27.5B ... and linkage



27.6 Withdraw the assembly from the scuttle



27.7 Spindle nut (A) and motor-to-linkage bracket bolts (B)



28.5 Tailgate wiper motor retaining bolts (arrowed)

27 Windscreen wiper motor and linkage – removal and refitting

Note: *At the time of writing, insufficient information was available on the following procedure for vehicles equipped with the Anti-Lock Braking System and the advice of a dealer should be sought before proceeding. Do not disconnect any of the ABS components for improved access to the wiper components.*

1 Disconnect the battery negative terminal.
2 Remove the air intake grille (Chapter 11).
3 Unbolt and remove the cover over the wiper motor.
4 Remove the nuts securing the brake master cylinder to the vacuum servo unit, lift the cylinder from the studs and pull it back slightly. Do not disconnect any brake lines.
5 Undo the nuts securing the motor and linkage to the scuttle (photos).
6 Withdraw the assembly from the scuttle (photo).
7 Separate the motor from the linkage by undoing the spindle nut and motor-to-linkage bracket bolts (photo).
8 The motor and linkage cannot be overhauled and if either is defective must be renewed.
9 Refit in reverse order.

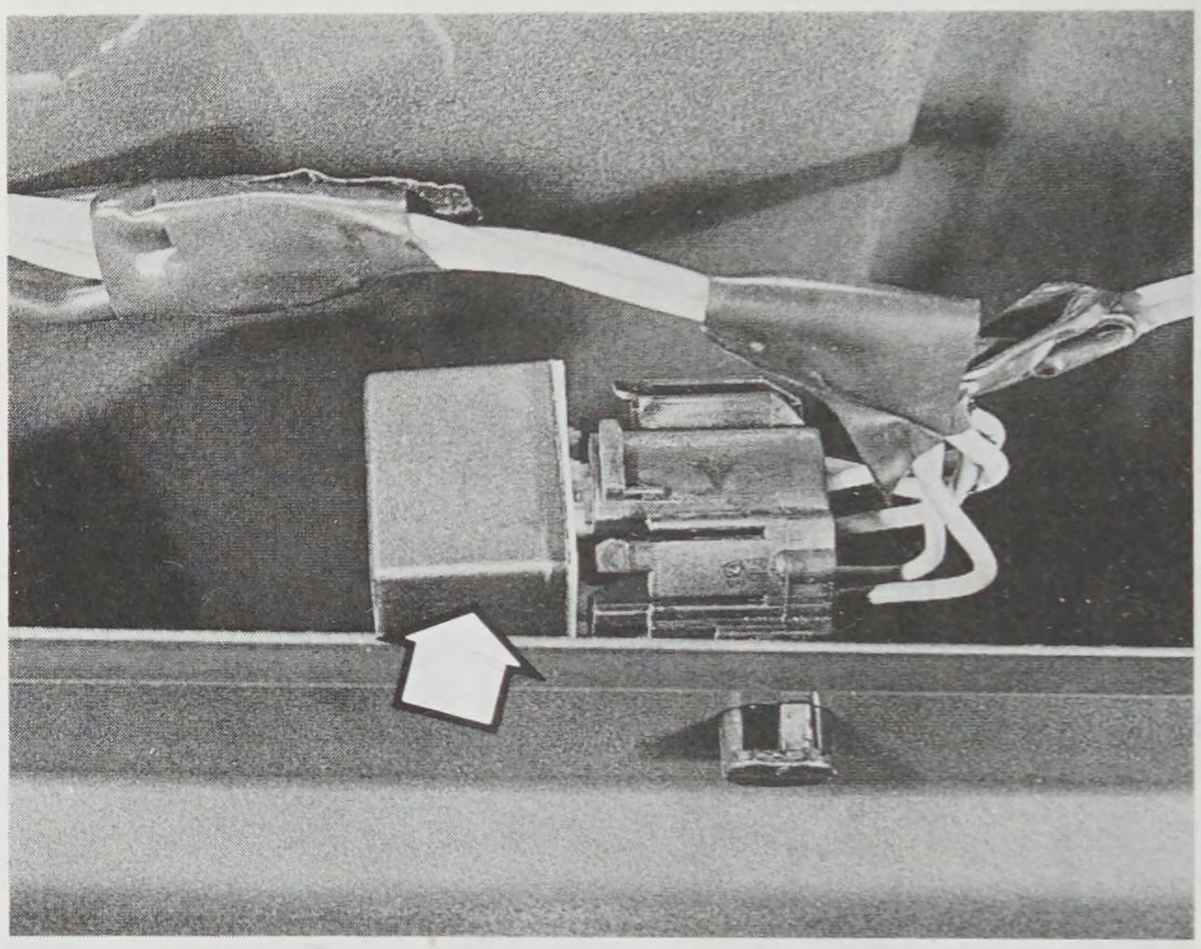
Note: *When refitting the wiper linkage, ensure that the linkage will not contact any part of the main or component wiring looms causing chafing and subsequent failure of the electrical continuity. If necessary, fit extra cable ties or re-route the looms.*

28 Tailgate wiper motor – removal and refitting

1 Remove the wiper arm and blade as described in Section 29.
2 Unscrew the large spindle retaining nut and lift off the washer and seal underneath.
3 Disconnect the battery and open the tailgate.
4 Remove the tailgate trim panel as described in Chapter 11, Section 18.
5 Remove the motor retaining bolts (photo) and withdraw the motor, then disconnect the electrical lead and remove the motor from the tailgate.
6 Refit in reverse order.
7 The windscreen wiper motor relay is clipped into a plastic junction box in the tailgate (photo).

29 Tailgate wiper arm and blade – removal and refitting

1 Pull up the hinged cover over the arm spindle (photo)
2 Remove the spindle nut and lift off the arm and blade (photo).



28.7 Windscreen wiper motor relay (arrowed)

3 To renew the blade, unhook it from the arm (photo).
4 Refit in reverse order, lining up the arm with the lower edge of the rear screen before tightening the retaining nut.

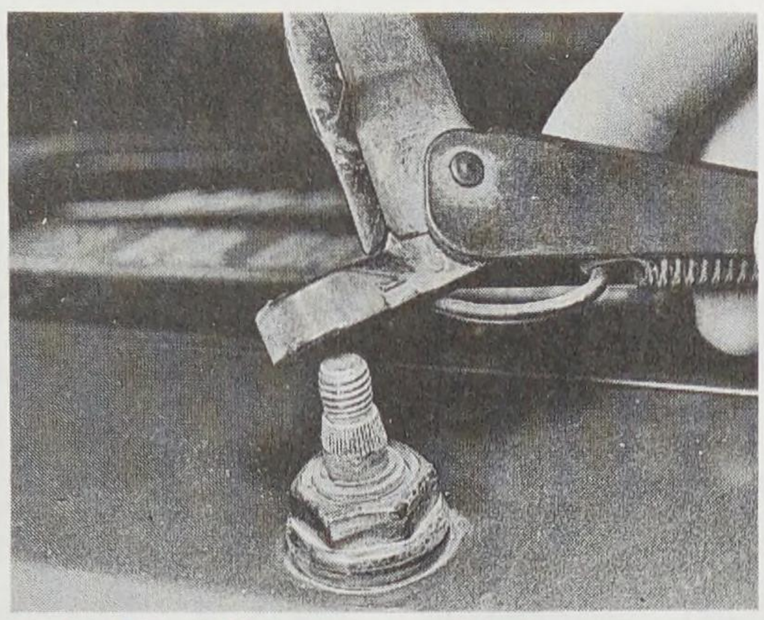
30 Windscreen wipers – removal and refitting

Removal of both the wiper arm and the blade are as described for the tailgate wiper arm (Section 29) with the addition that the washer tubing must be disconnected. There is also an additional clip at the top end of the arm (photos).

31 Windscreen wash system – general

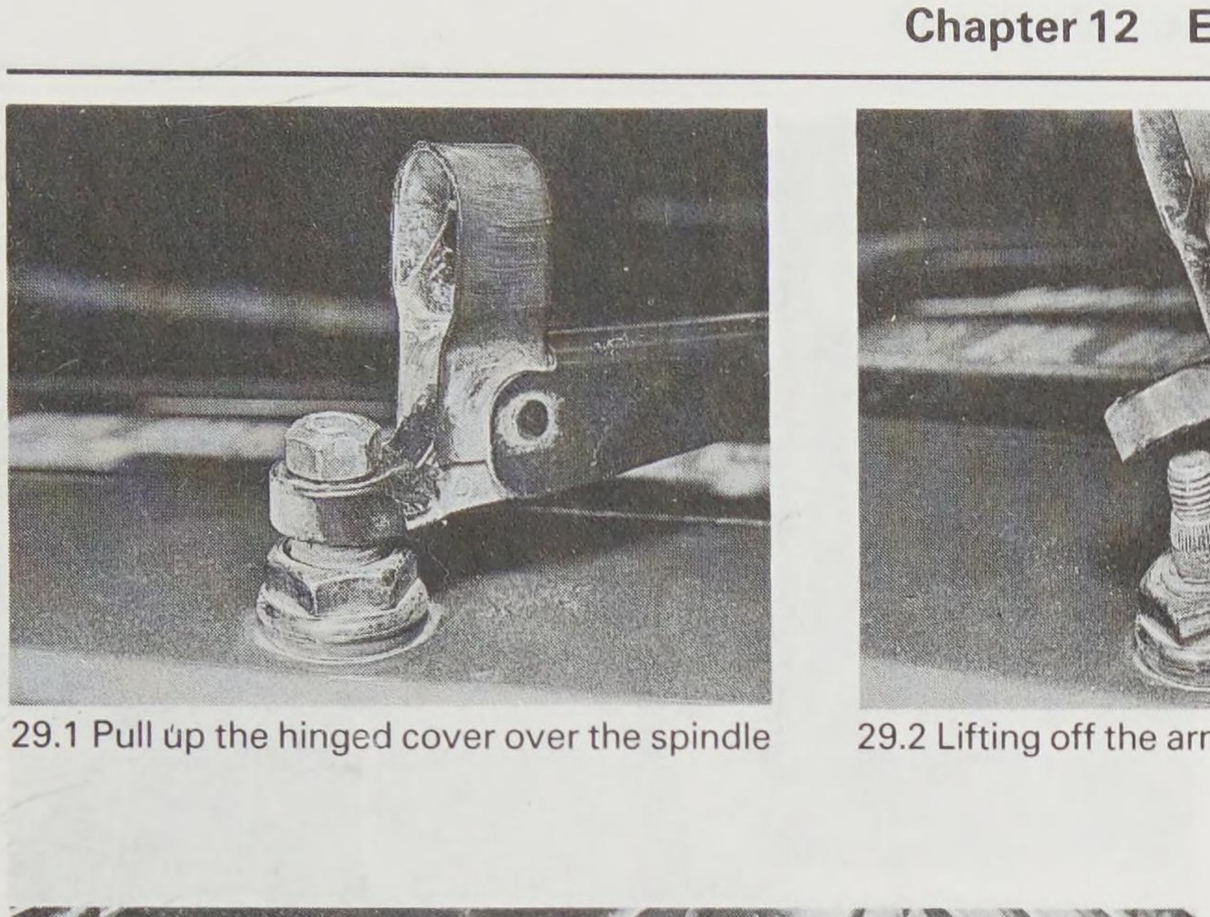
1 The windscreen wash bottle is located in the right-hand side of the scuttle (photo).

29.1 Pull up the hinged cover over the spindle

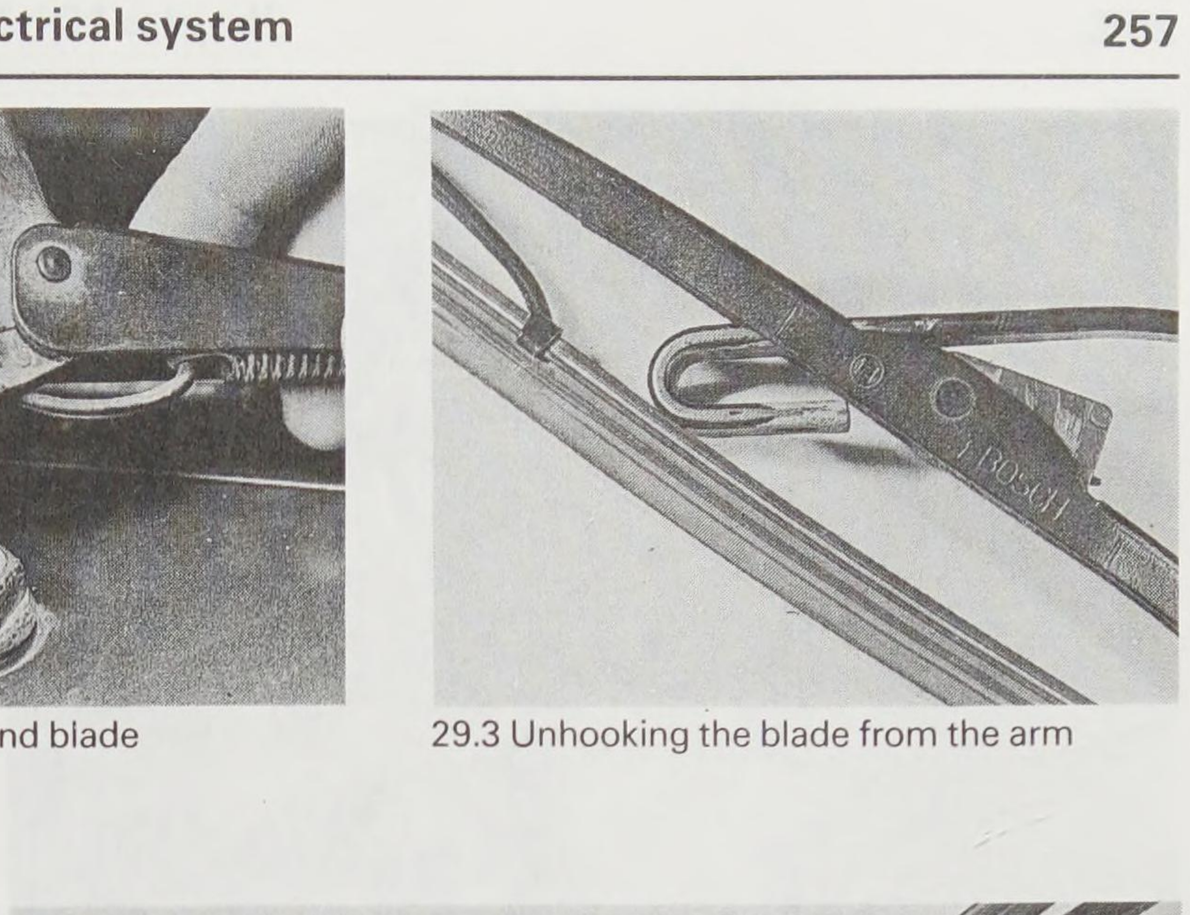


29.2 Lifting off the arm and blade

29.3 Unhooking the blade from the arm



30.0A Windscreen wiper arm showing washer tubing connection (arrowed)



30.0B Clip at top of arm (arrowed)

2 The bottle should be filled with clean water to which a windscreen wash solution can be added. Do not use household cleaner or washing-up liquid. These can cause smearing of the screen which can be particularly dangerous at night.

3 An electric motor in the side of the bottle pumps the fluid to the wipers via plastic tubing. If the motor should fail, unbolt the bottle from the scuttle, disconnect the electrical lead to the motor and the washer tubing, and pull the motor from the bottle. Plug the rubber seal into which the motor fits or empty the bottle of washer fluid. Fit a new motor (the procedure is a reversal of removal), ensuring the seal is in good condition (photos).

4 The system will benefit from a periodic flush out with warm water.

Note: *On some early production models, if the washer fluid continues to bleed from the washer jets for a time after use, remove the ball and spring from the inside of the non-return valve located between the washer bottle and the T-piece on the front scuttle.*

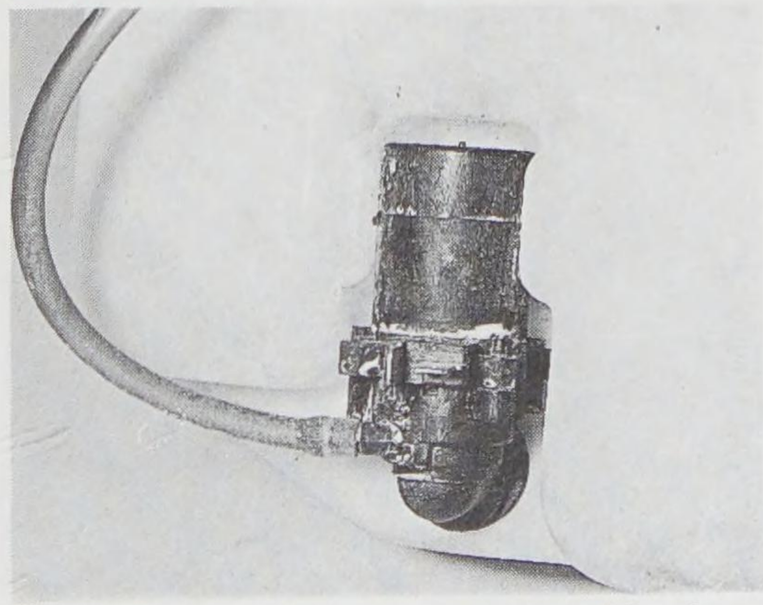
32 Tailgate wash system – general

1 The general comments in Section 31 apply equally to the tailgate wash system.

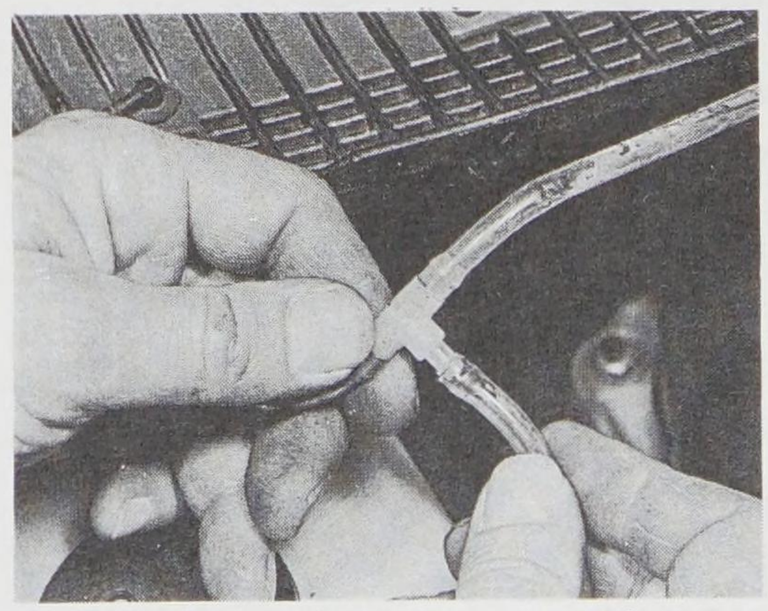
2 The washer bottle is located behind the access panel in the right-hand side of the load space.

3 To remove the bottle, undo the retaining screws and lift out (photos).

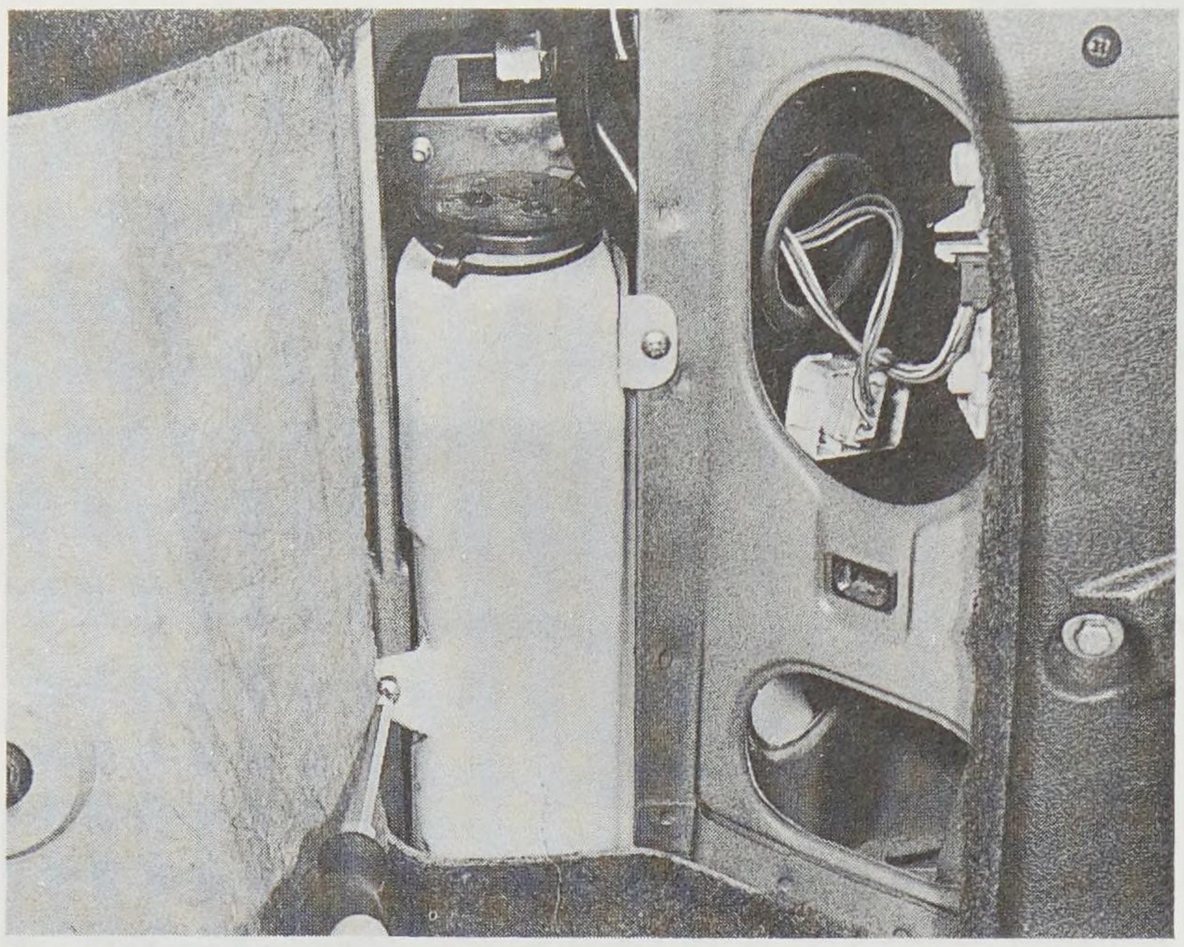
31.1 Windscreen wash bottle



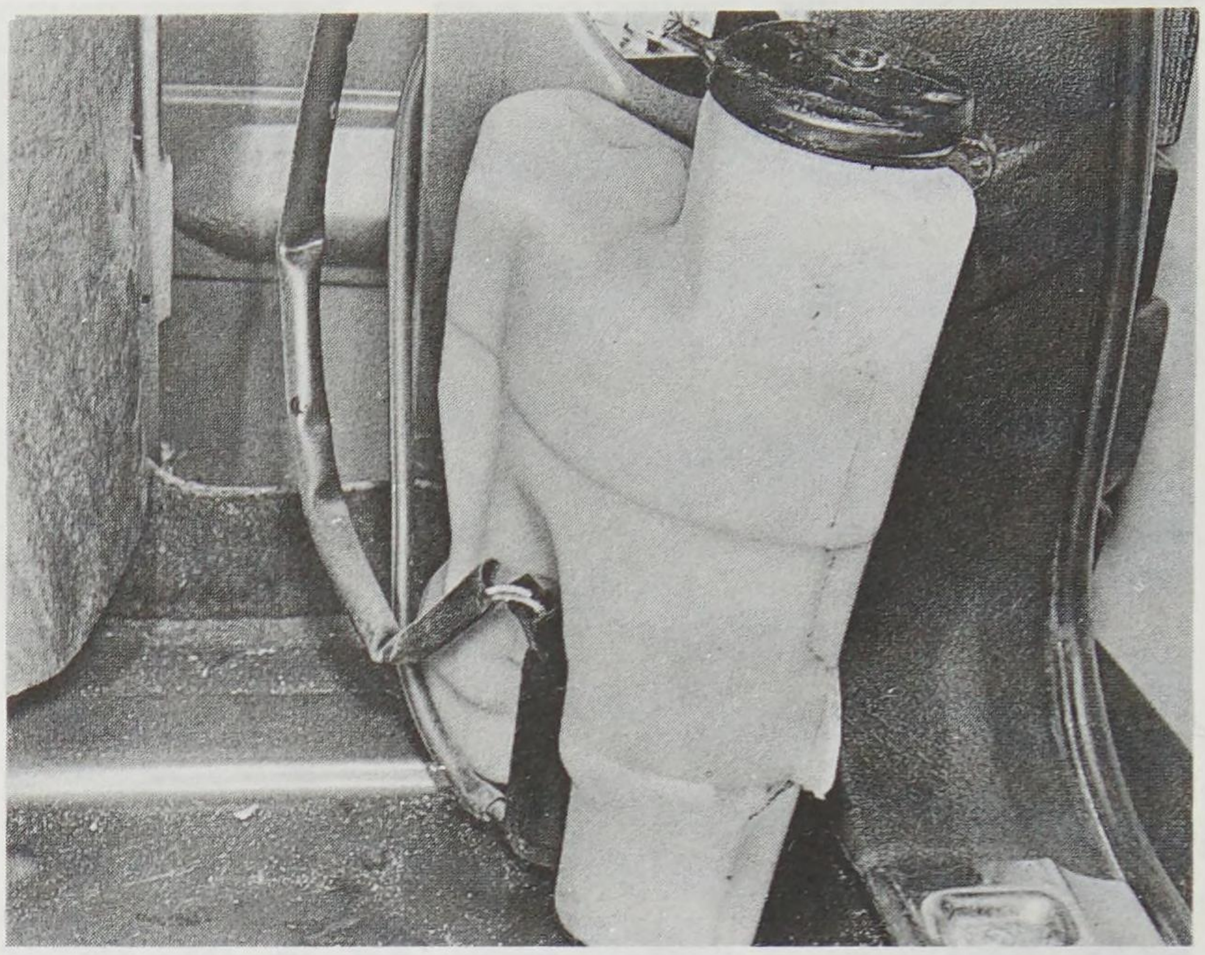
31.3A Windscreen wash motor on side of bottle



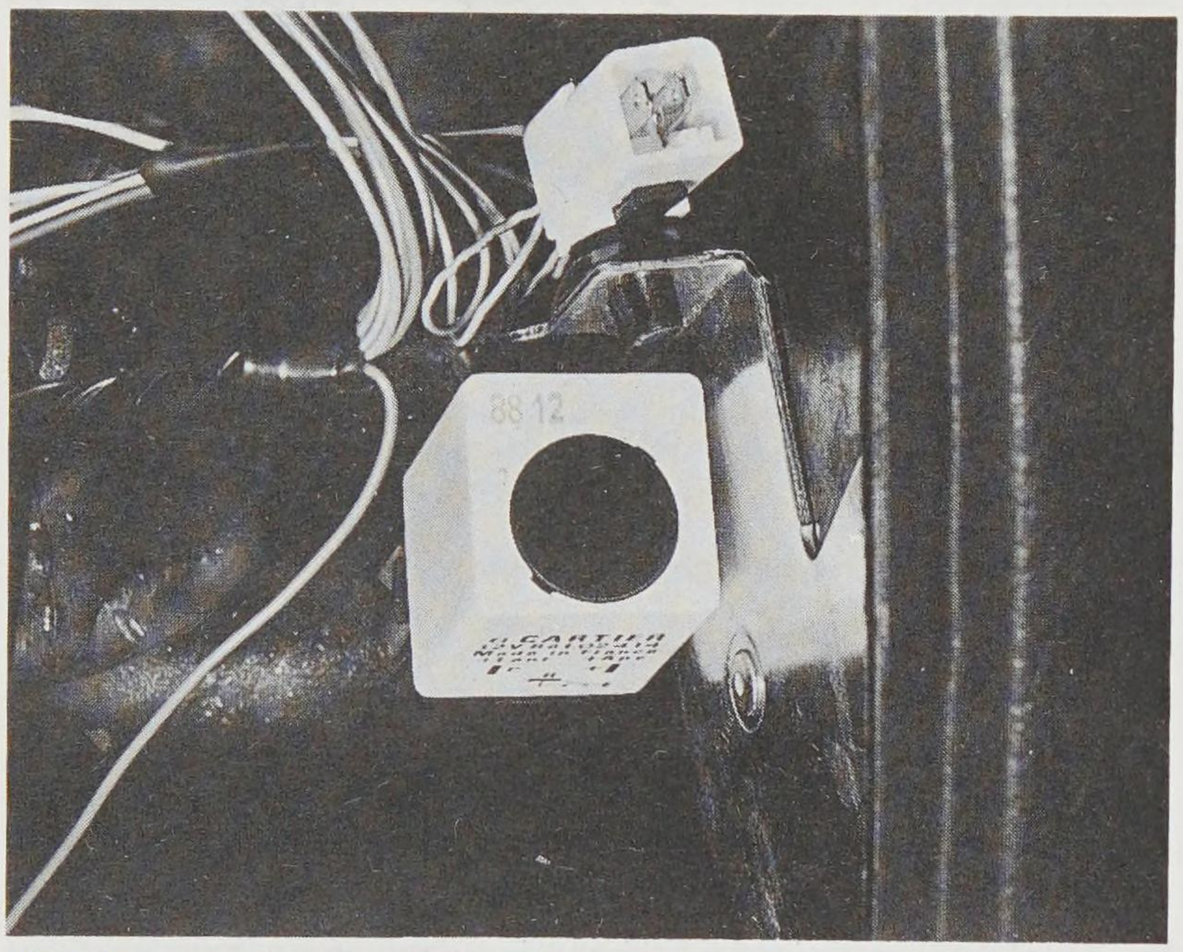
31.3B Typical washer tubing connection



32.3A Undo the retaining screws ...



32.3B ... and lift out the bottle



33.2 Headlamp 'on' warning buzzer

33 Headlamp 'on' warning buzzer – removal and refitting

1 Lower the fusebox panel as described in Section 11.
2 Locate the warning unit mounted on a bracket above the fusebox (photo).
3 Disconnect the leads and pull the unit from the bracket.
4 Refit in reverse order.

34 Lamps (front, exterior) – bulb renewal

1 Prop open the bonnet and disconnect the battery negative terminal.

Headlamp bulb

2 Pull back the clip securing the cover to the rear of the headlamp unit (photo).
3 Disconnect the electrical connection on the back of the bulb (photo).
4 Release the spring clip holding the bulb in the lamp unit (photo).
5 Withdraw the bulb (photo). Do not handle the bulb by the glass portion but by the base. If the glass is touched with the fingers, clean it in methylated spirit before refitting.

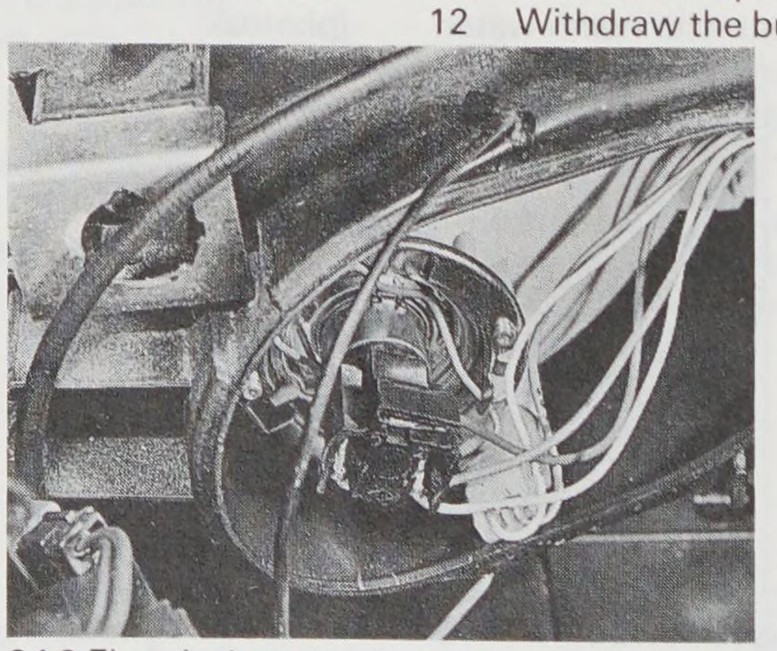
Sidelamp

6 The sidelamp is contained in the headlamp housing.
7 Pull out the bulbholder (photo).
8 Pull out the bulb. It is a push-fit in the holder (photo).

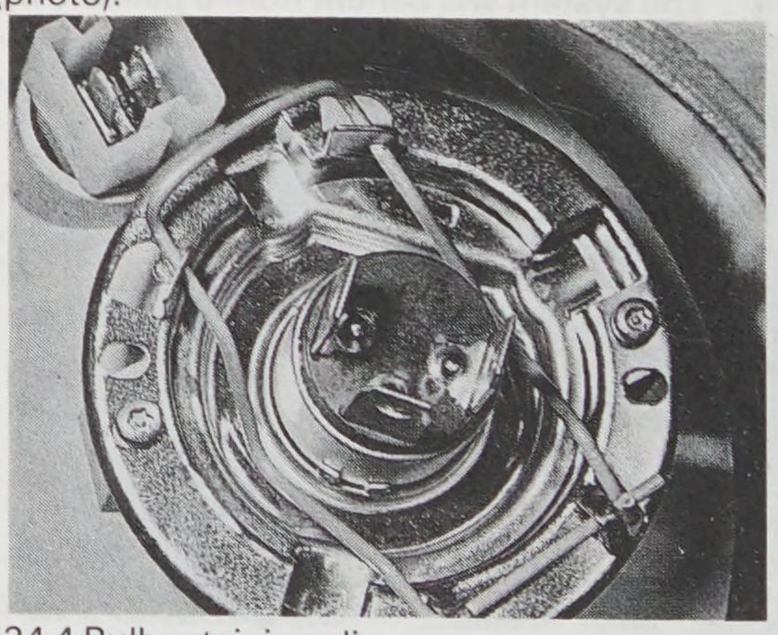
Driving lamp

9 The driving lamp (where fitted) is also contained within the headlamp unit.
10 Disconnect the electrical connector.
11 Release the spring clip securing the bulb in the lamp unit (photo).
12 Withdraw the bulb (photo).

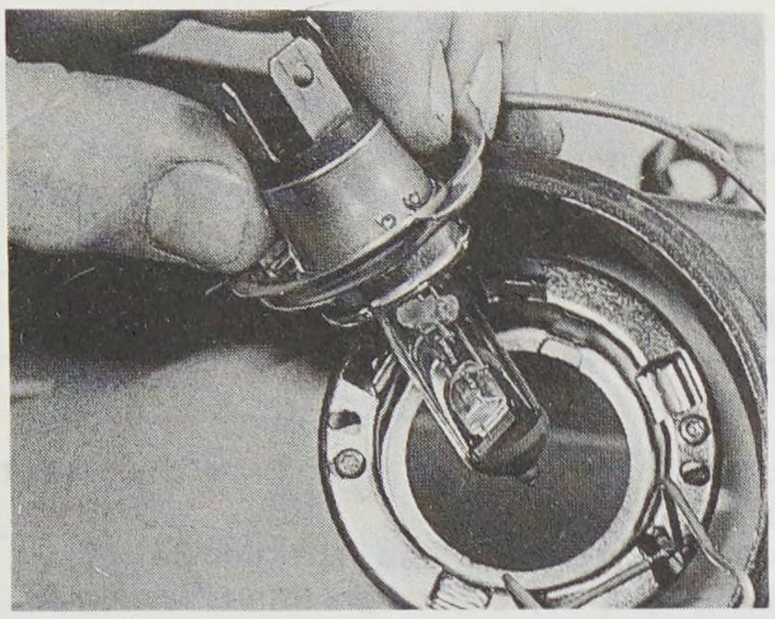
34.2 Headlamp cover clip (arrowed)



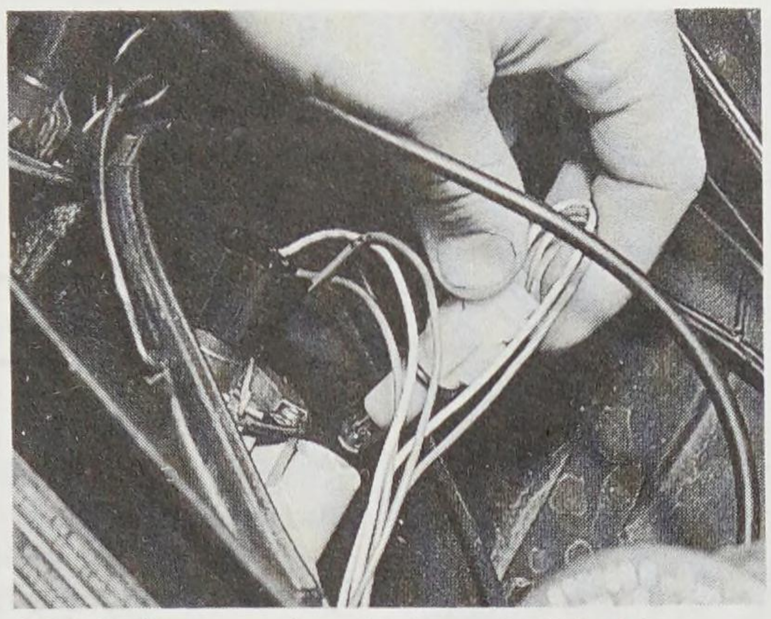
34.3 Electrical connections on rear of lamp



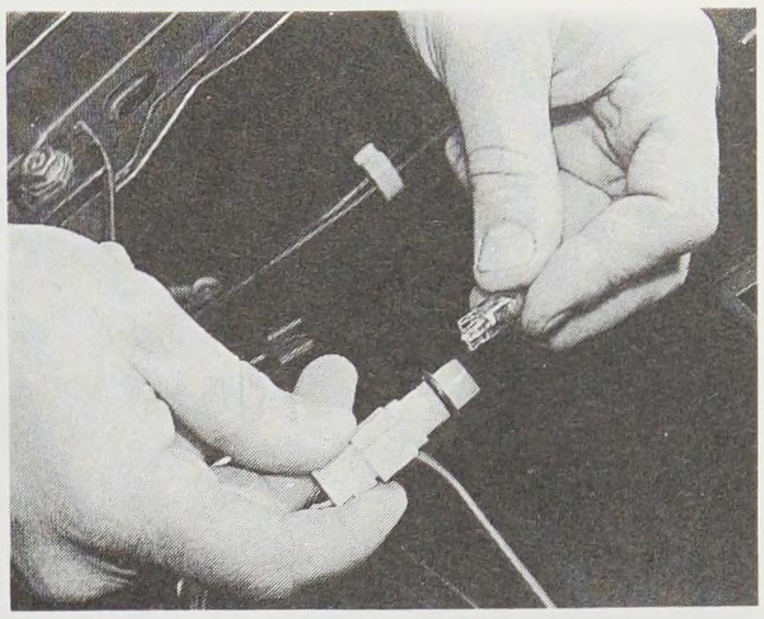
34.4 Bulb retaining clip



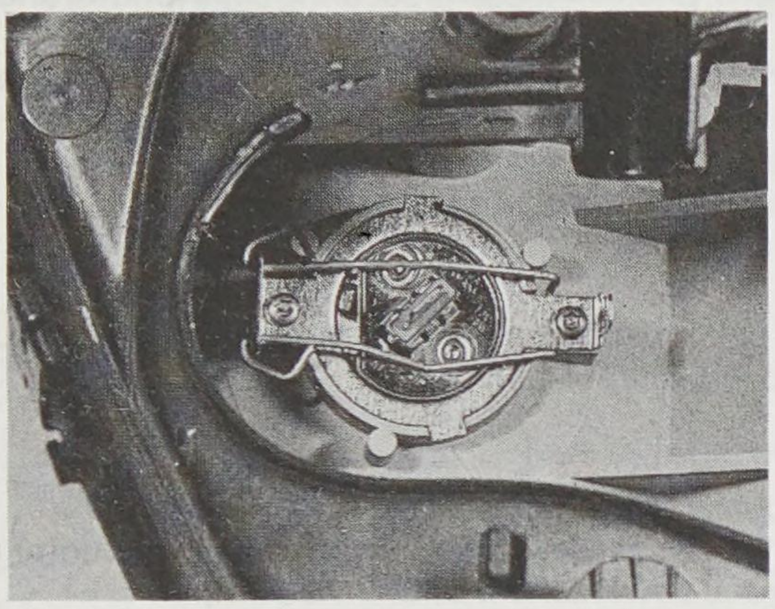
34.5 Withdrawing the bulb



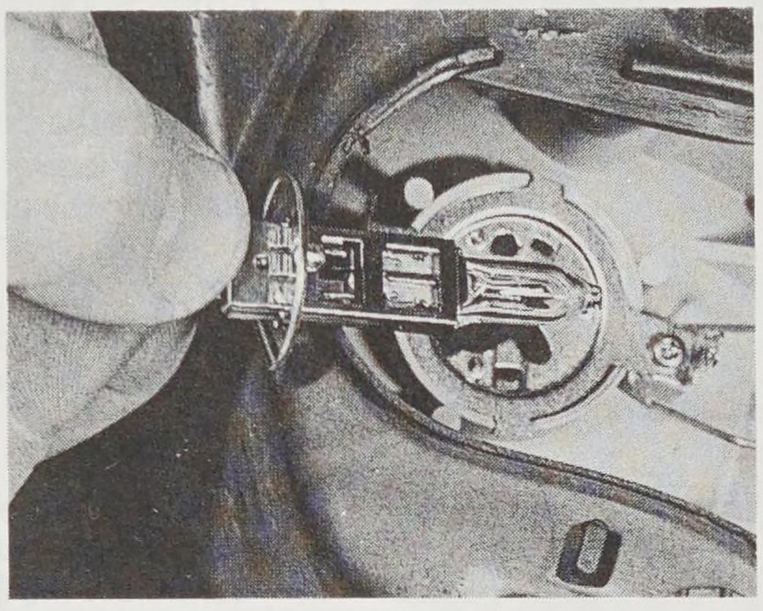
34.7 Pulling out the sidelamp bulbholder



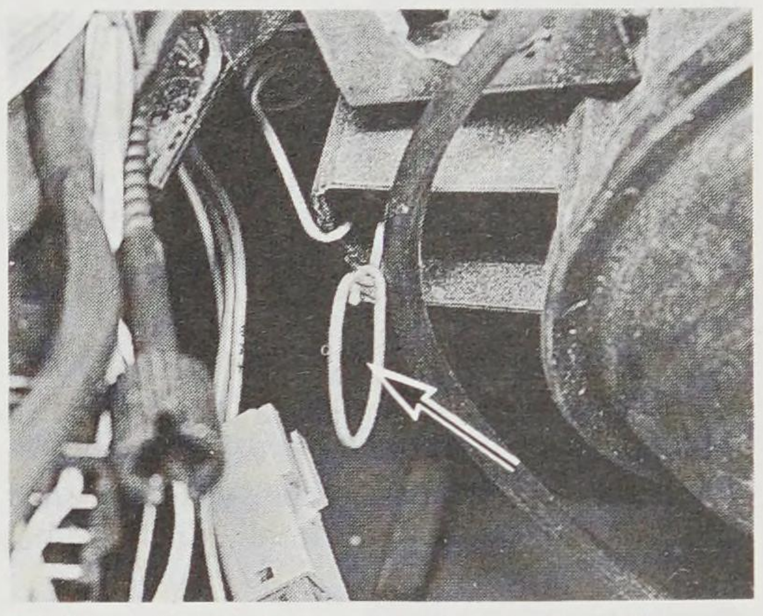
34.8 Bulb is a push-fit in holder



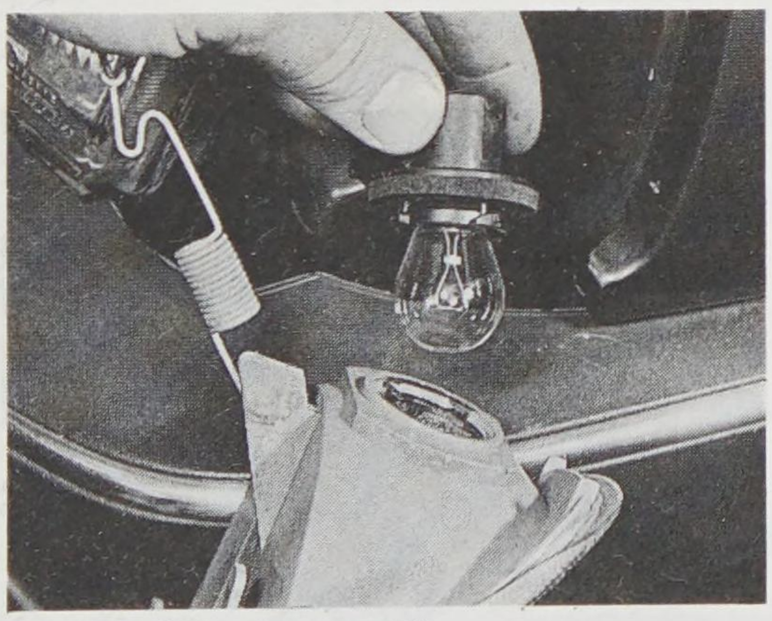
34.11 Driving lamp bulb securing clip



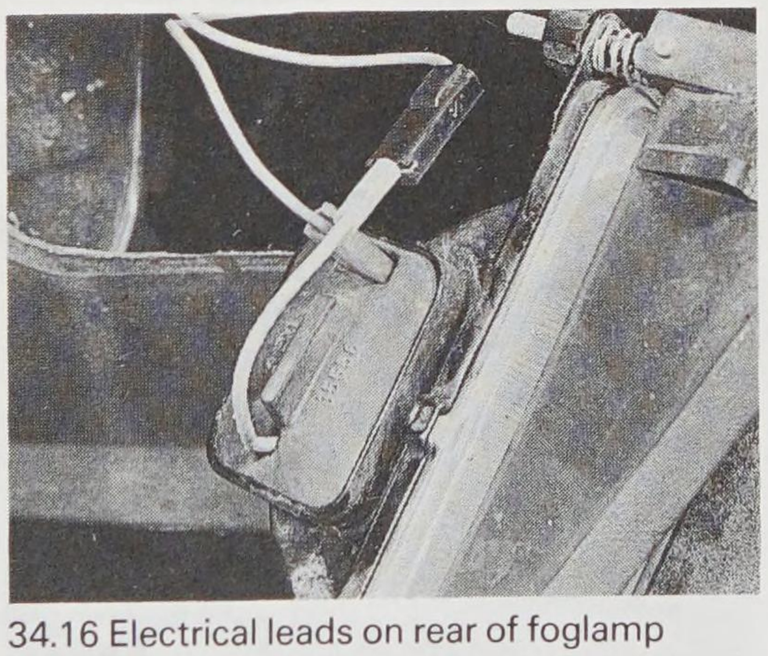
34.12 Withdrawing the bulb



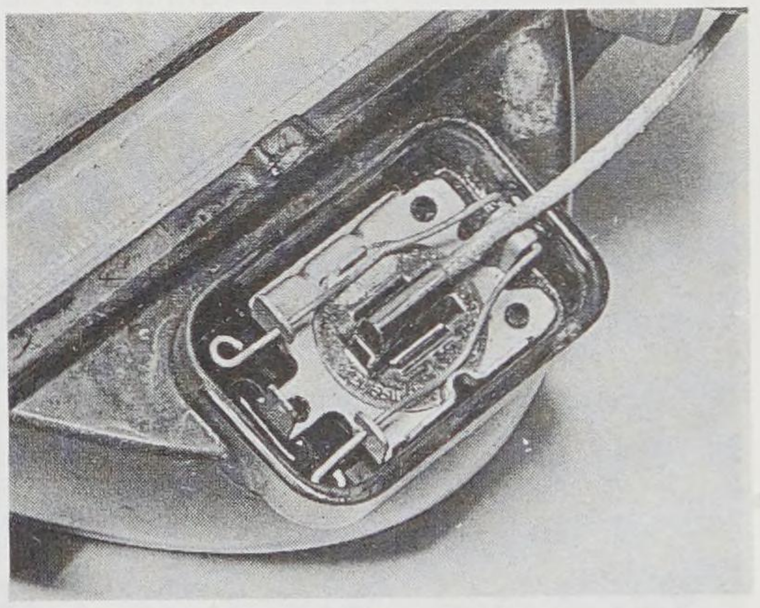
34.13 Indicator lamp securing spring clip (arrowed)



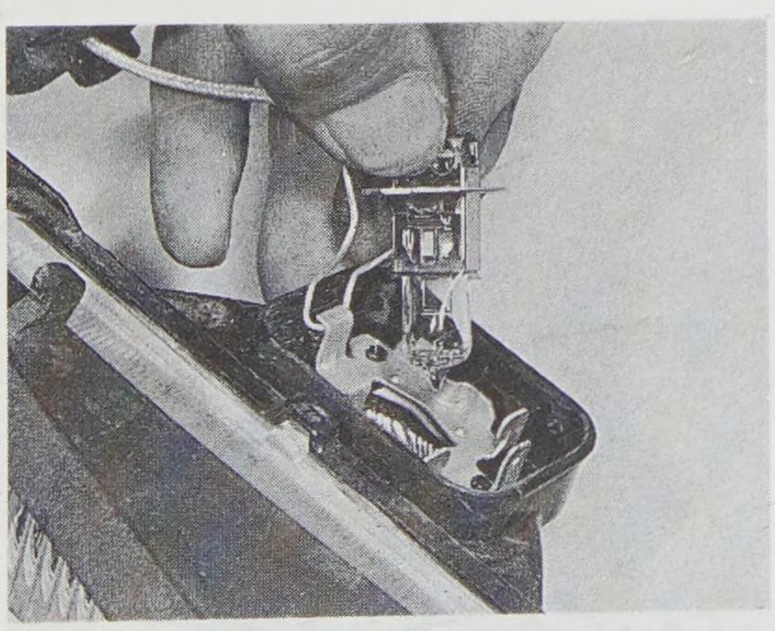
34.15 Bulb is a bayonet fix



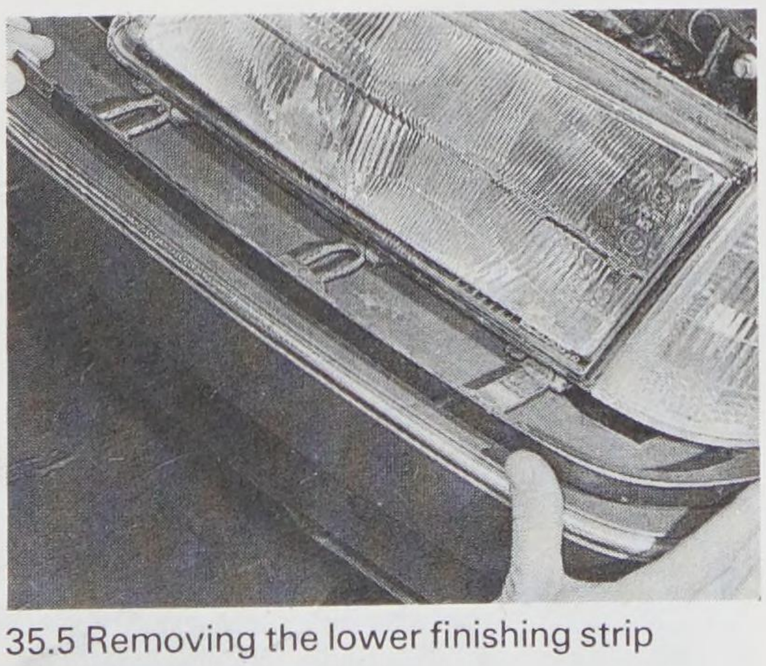
34.16 Electrical leads on rear of foglamp



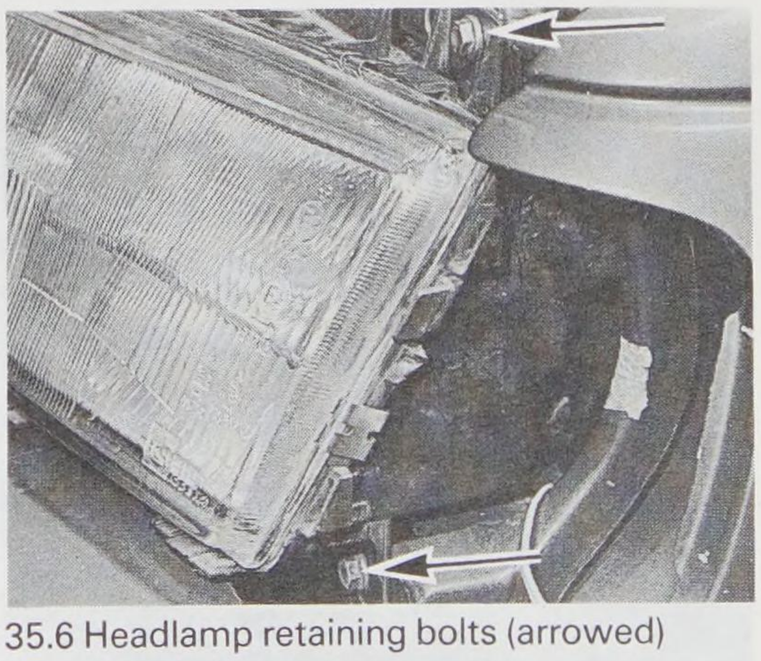
34.18 Bulb retaining clip



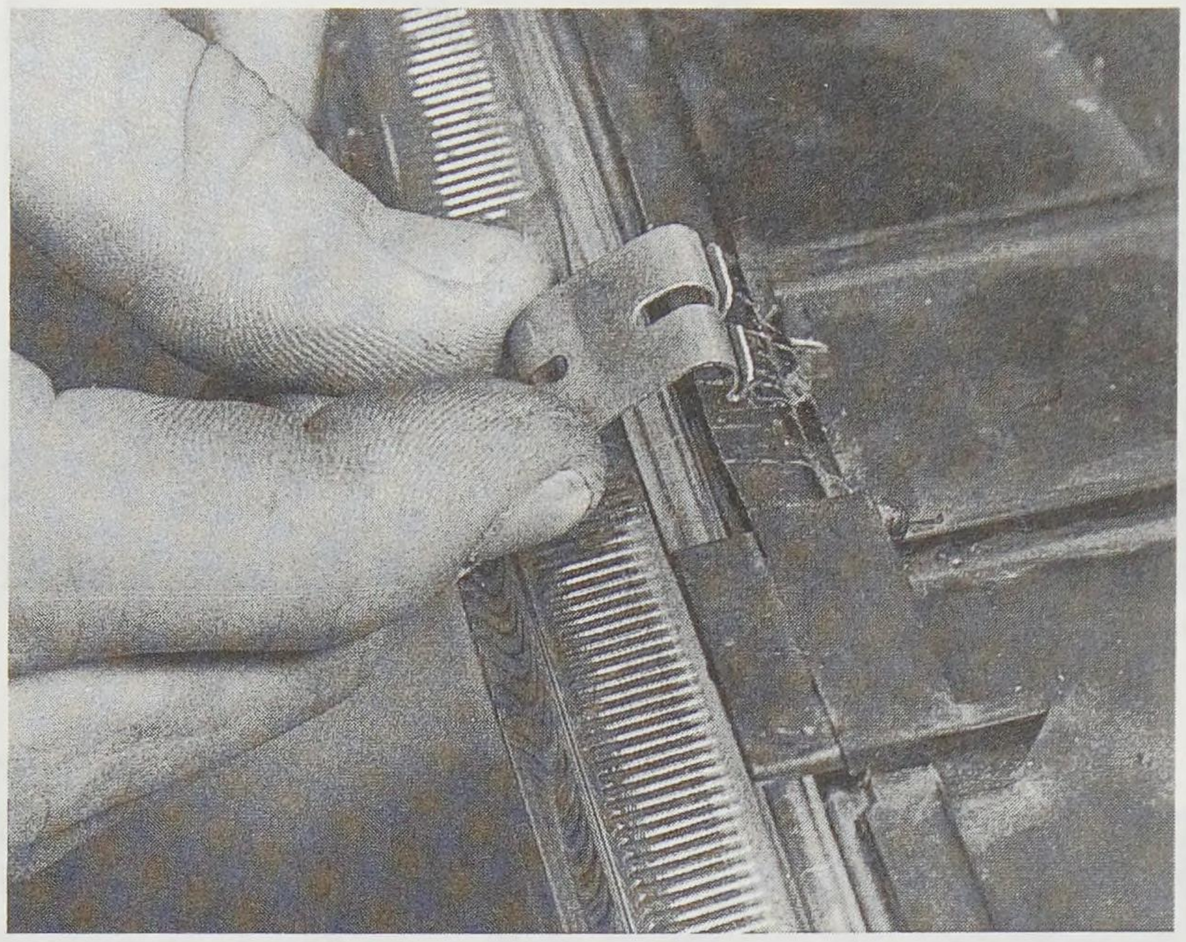
34.19 Withdrawing the bulb



35.5 Removing the lower finishing strip



35.6 Headlamp retaining bolts (arrowed)



35.7 Removing a lens securing clip

Indicator lamp

13 Release the spring clip at the side of the headlamp unit securing the indicator lamp unit in the wing (photo).
14 From outside the vehicle, ease the lamp unit from the wing.
15 Release the bulb from the unit. It is a bayonet fix (photo).

Front foglamp

16 From underneath the front bumper, disconnect the leads at the rear of the lamp (photo).
17 Prise out the rubber cover.
18 Release the spring clip securing the bulb in the unit (photo).
19 Withdraw the bulb (photo).

All lamps

20 The refitting of all bulbs is a reversal of removal.

35 Lamps (front, exterior) – removal and refitting

Headlamp unit

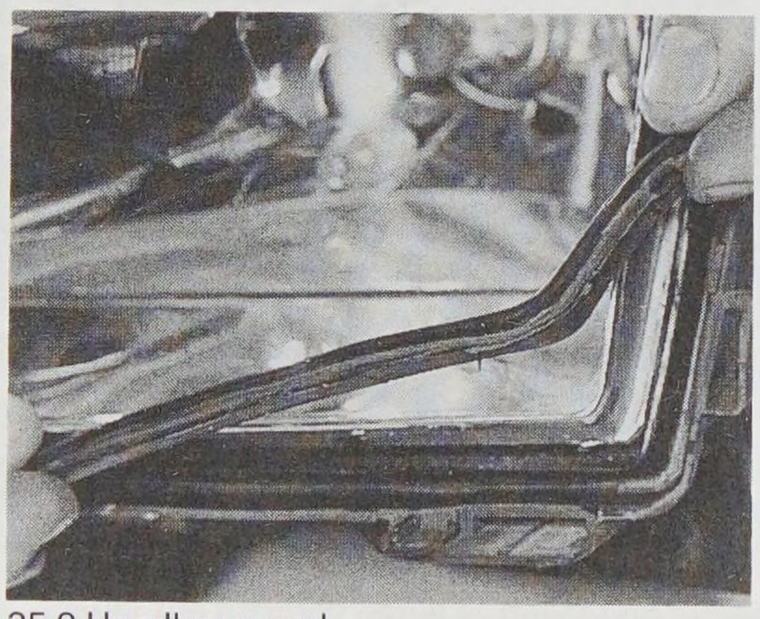
1 Proceed as in paragraphs 1 to 3 of Section 34, and also disconnect the side and driving lamps.
2 Remove the indicator lamp unit as described in Section 34.
3 Disconnect the headlamp beam adjuster, where fitted (Section 39).
4 Remove the radiator grille as described in Chapter 11, Section 6.
5 Unclip and remove the lower finishing strip (photo).
6 Remove the headlamp retaining bolts (photo) and withdraw the unit.
7 To renew a cracked lens, prise off the lens securing clips (photo) and withdraw the lens.
8 Ensure the seal is in good condition and located correctly in the groove round the headlamp unit (photo).
9 Fit a new lens and secure with the clips.
10 Refitting the headlamp unit is a reversal of removal.

Indicator lamp

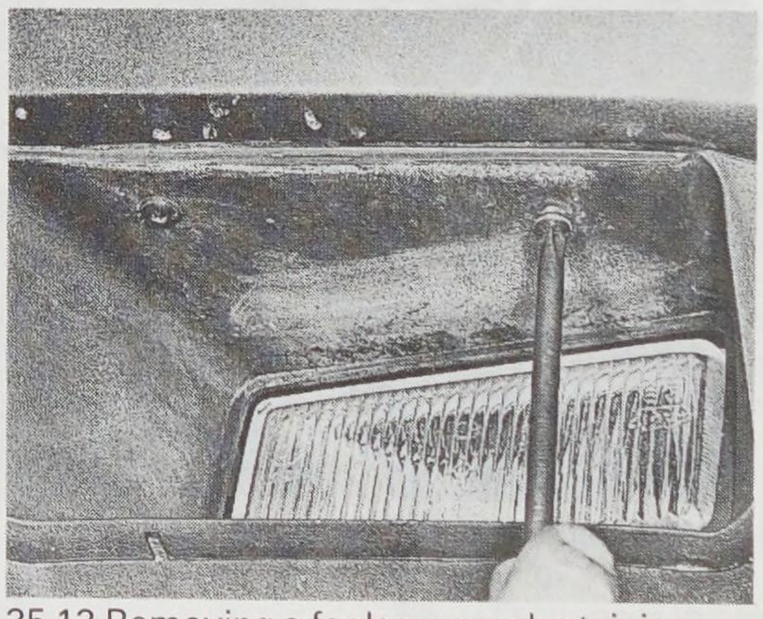
11 The indicator lamp unit must be renewed complete if it is broken. This operation is covered in Section 34.

Front foglamp

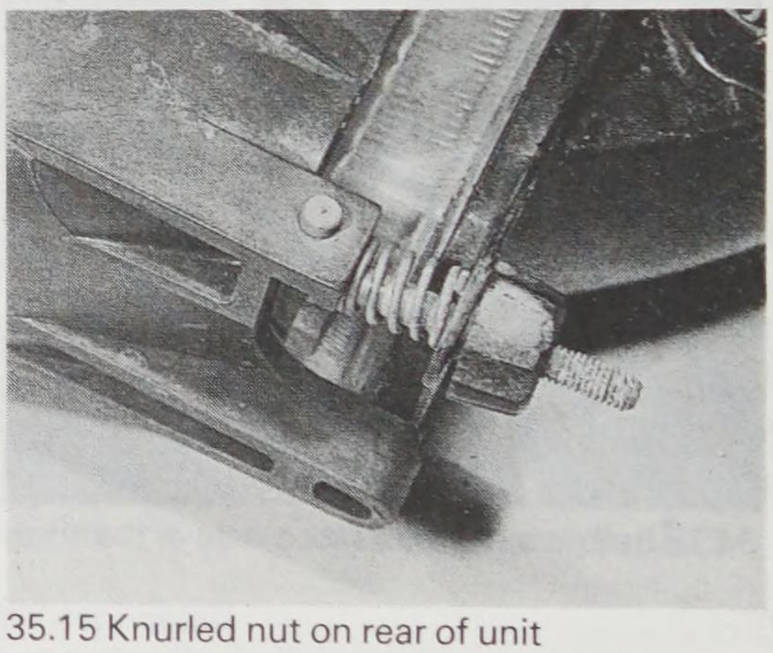
12 Disconnect the electrical leads as described in Section 34.
13 Remove the two retaining screws from the foglamp cowl (photo).
14 Withdraw the lamp and cowl rearward from the bumper.
15 Remove the lamp from the cowl by undoing the knurled nut at the rear of the unit (photo).
16 The lamp must be renewed if it is broken.
17 Refitting is a reversal of removal, adjusting the beam by using the knurled nuts.



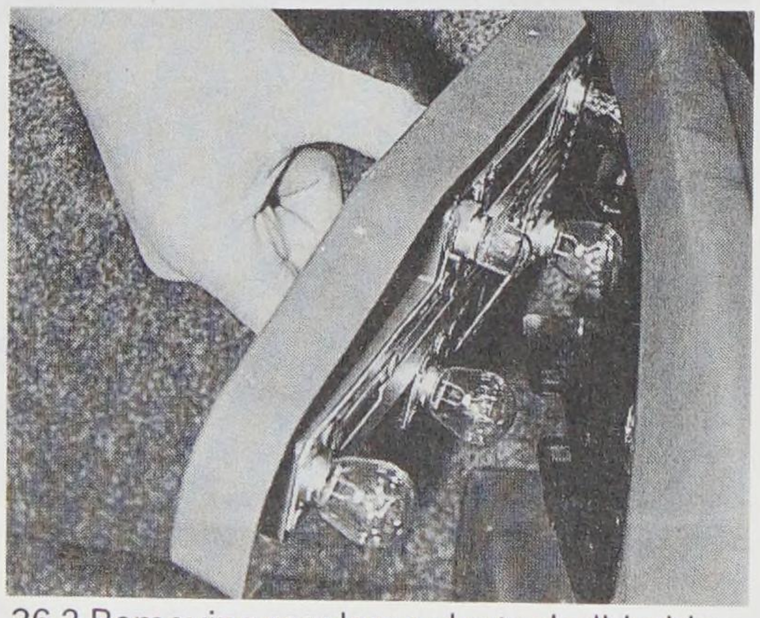
35.8 Headlamp seal



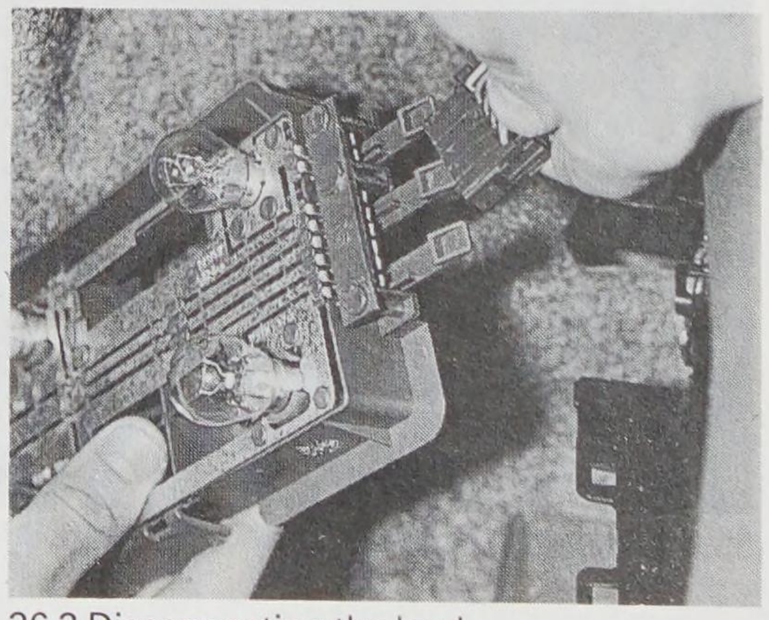
35.13 Removing a foglamp cowl retaining screw



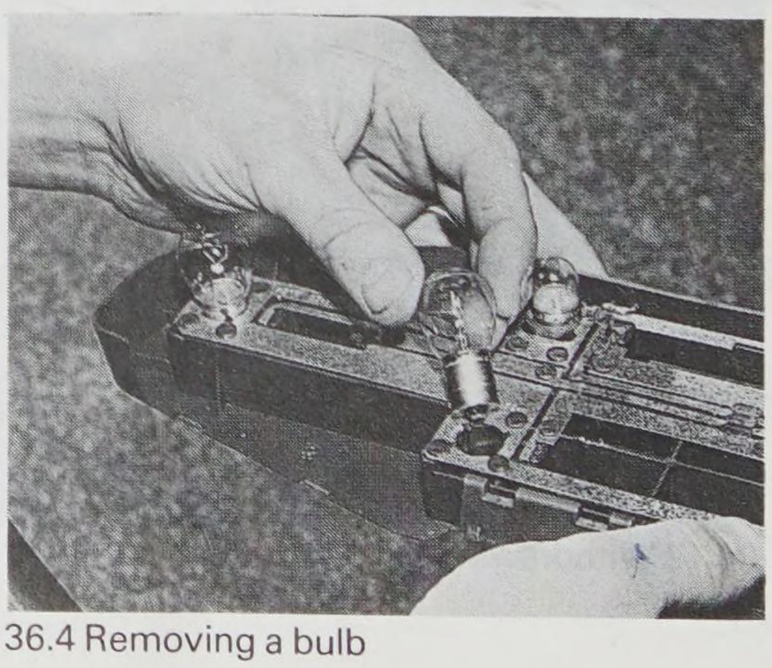
35.15 Knurled nut on rear of unit



36.2 Removing rear lamp cluster bulbholder



36.3 Disconnecting the lead



36.4 Removing a bulb

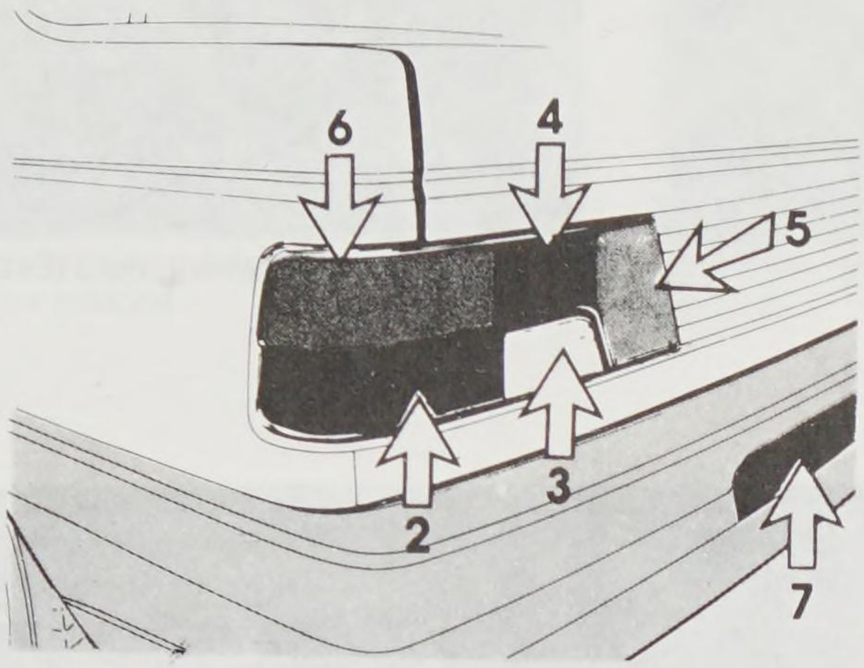


Fig 12.4 Rear lamp cluster bulb identification (Saloon) (Sec 36)

2 Indicator lamp
3 Reversing lamp
4 Reflector
5 Foglamp
6 Stop/tail lamp

36 Lamps (rear, exterior) – bulb renewal

Saloon

1 Open the boot.
2 Unclip and pull out the bulbholder (photo).
3 Disconnect the lead (photo).
4 All bulbs in the holder are a bayonet fix (photo).
5 Bulb identification is shown in Fig. 12.4.

Estate (stop/tail and indicator lamps)

6 Open the tailgate.
7 Release the lock button and open the panel in the side trim.
8 Reach in through the upper aperture and unclip and withdraw the bulbholder (photo).
9 Disconnect the holder and remove it (photo). The bulbs are a bayonet fix.
10 Reconnect the lead, fit the holder to the lamp unit and close the panel.

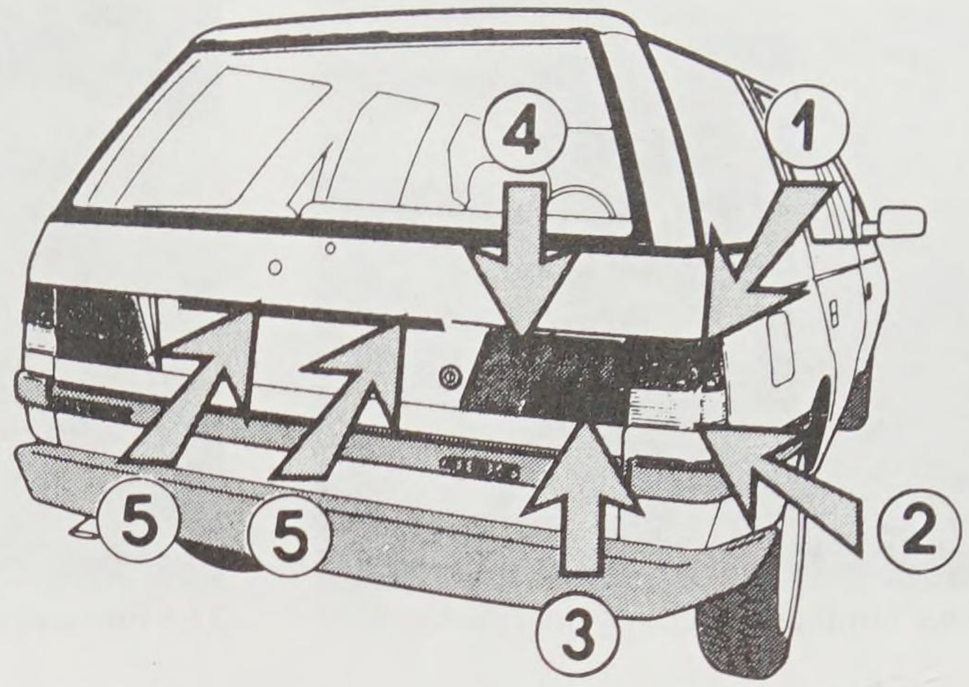


Fig 12.5 Rear lamp cluster bulb identification (Estate) (Sec 36)

1 Stop/tail lamp
2 Indicator
3 Reversing lamp
4 Foglamp
5 Number plate lamp(s)

Estate (reversing lamps and foglamps)

11 The procedure is the same as described for the stop/tail lamp and indicator lamp, but the lamp unit is in the tailgate (photo).
12 Identification of the bulbs is shown in Fig. 12.5.

37 Lamps (rear, exterior) – removal and refitting

Saloon

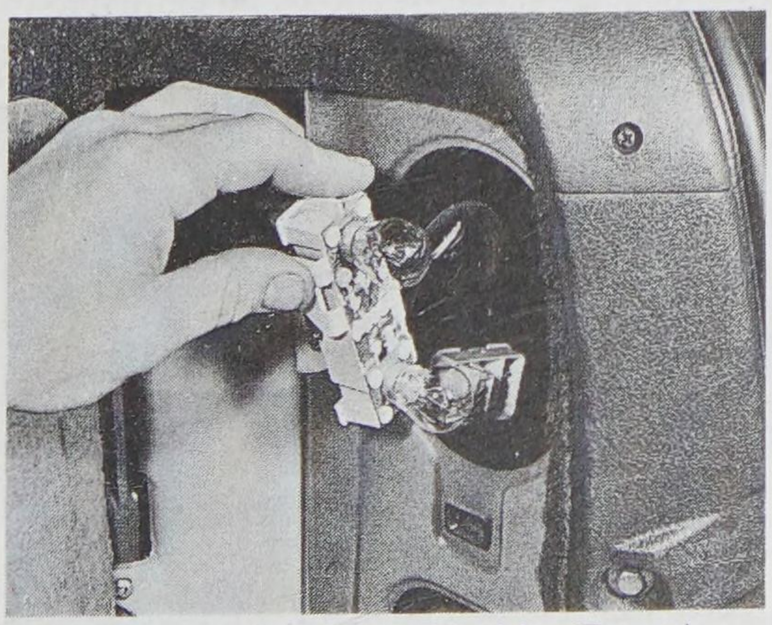
1 Disconnect the lamp unit or remove the holder as described in Section 36.
2 Pull up the boot weatherstrip and release the boot inner trim panel from the rear cross panel.
3 Undo the nuts securing the lamp unit to the cross panel (photo).
4 Withdraw the unit from outside the vehicle, outer edge first, disengaging the inner edge from the outer trim panel (photo).

Estate

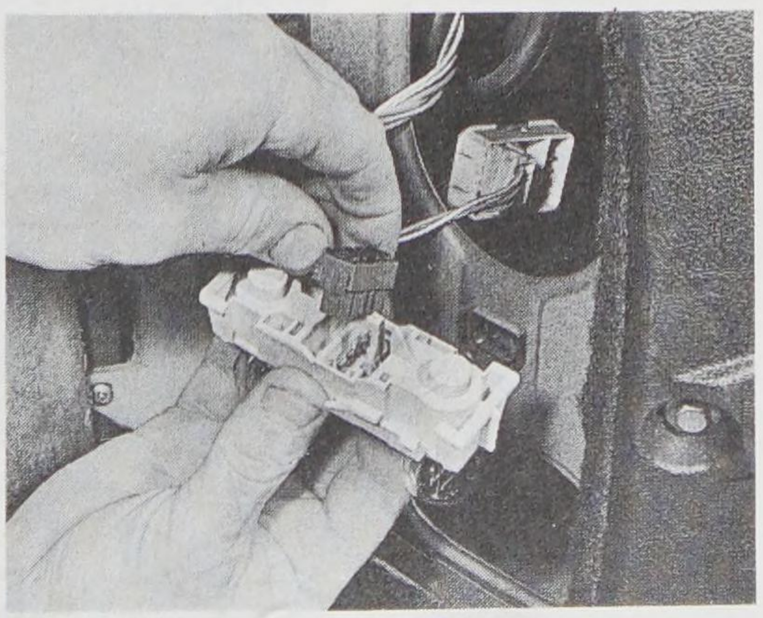
5 Gain access to the rear of the units as described in Section 36.
6 Disconnect the lamp units or remove the bulbholders.
7 Undo the lamp unit retaining nuts and withdraw the units from outside the vehicle (photos).

Saloon and Estate

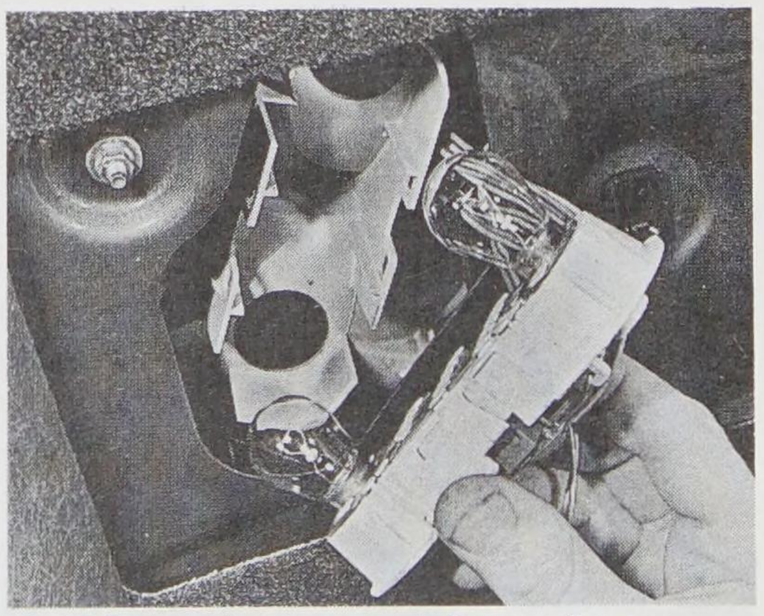
8 The lens units are one-piece, and if cracked or broken the complete unit must be renewed.
9 Refitting is a reversal of removal.



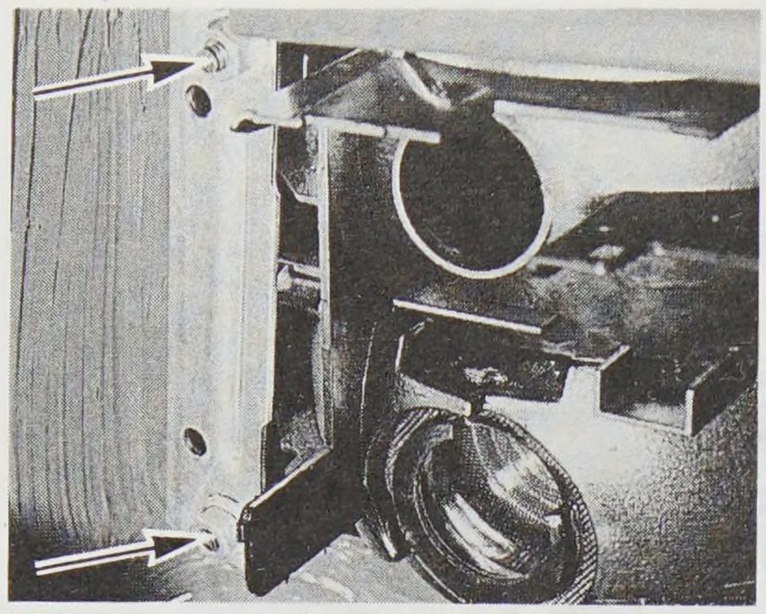
36.8 Withdrawing the bulbholder (Estate)



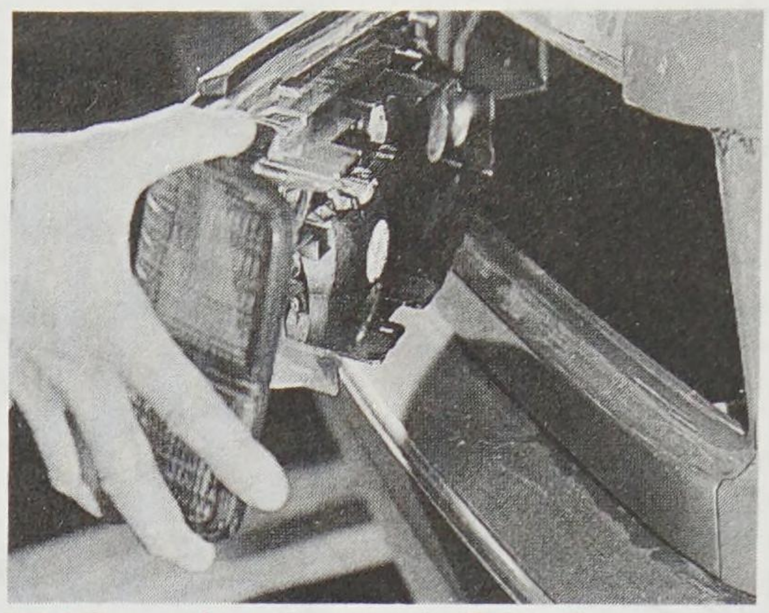
36.9 Disconnecting the holder



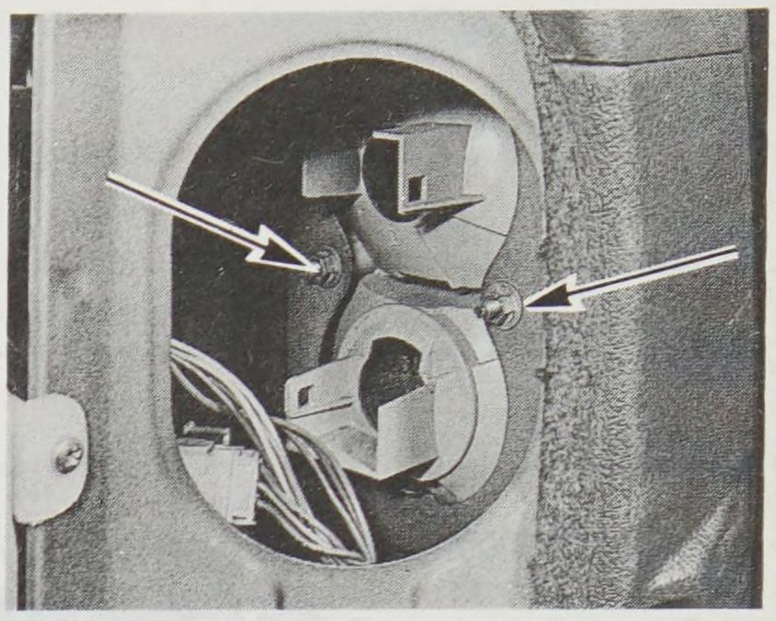
36.11 Removing lamp unit from tailgate



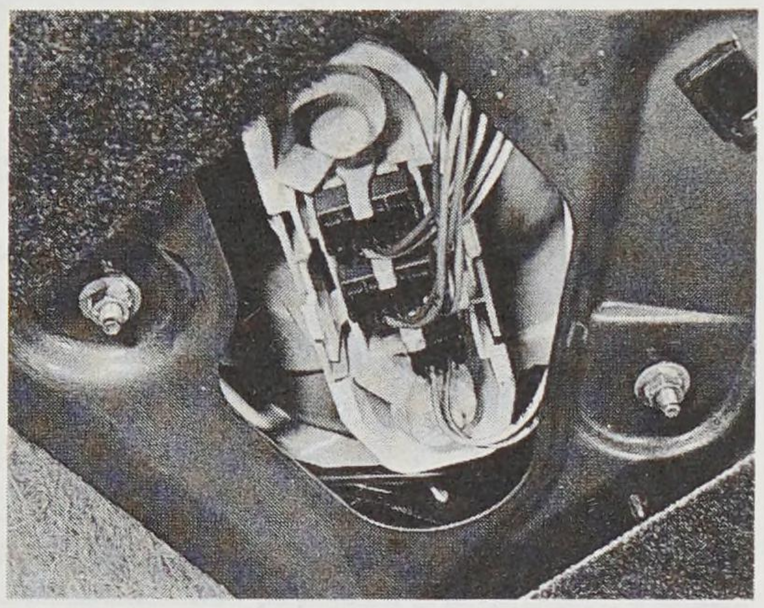
37.3 Rear lamp unit securing nuts (Saloon)



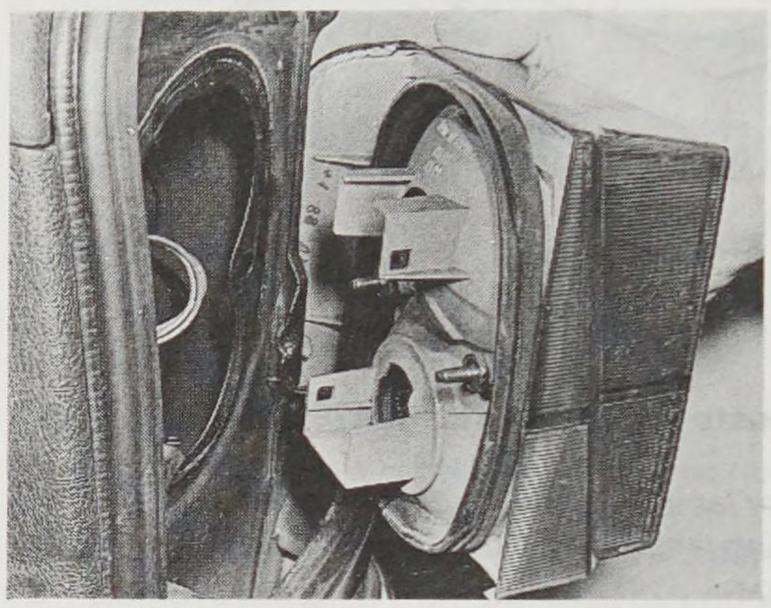
37.4 Removing a lamp unit (Saloon)



37.7A Lamp unit retaining nuts (Estate)



37.7B Lamp unit retaining nuts on tailgate



37.7C Withdrawing a lamp unit (Estate)

38 Number plate lamp – bulb renewal, removal and refitting

Saloon

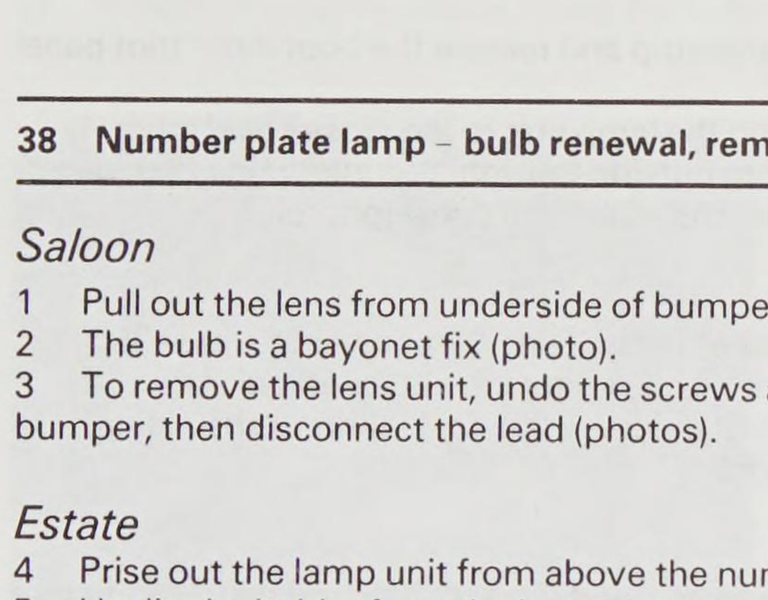
1 Pull out the lens from underside of bumper (photo).
2 The bulb is a bayonet fix (photo).
3 To remove the lens unit, undo the screws and pull the unit from the bumper, then disconnect the lead (photos).

Estate

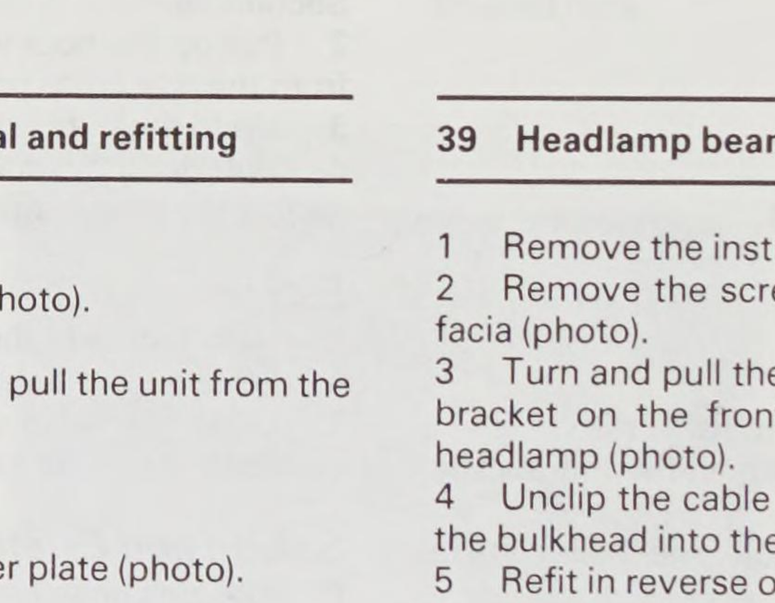
4 Prise out the lamp unit from above the number plate (photo).
5 Unclip the holder from the lens (photo).
6 The bulb is a bayonet fix (photo).

Saloon and Estate

7 Refitting is a reversal of removal



38.1 Pulling the lens from number plate lamp (Saloon)



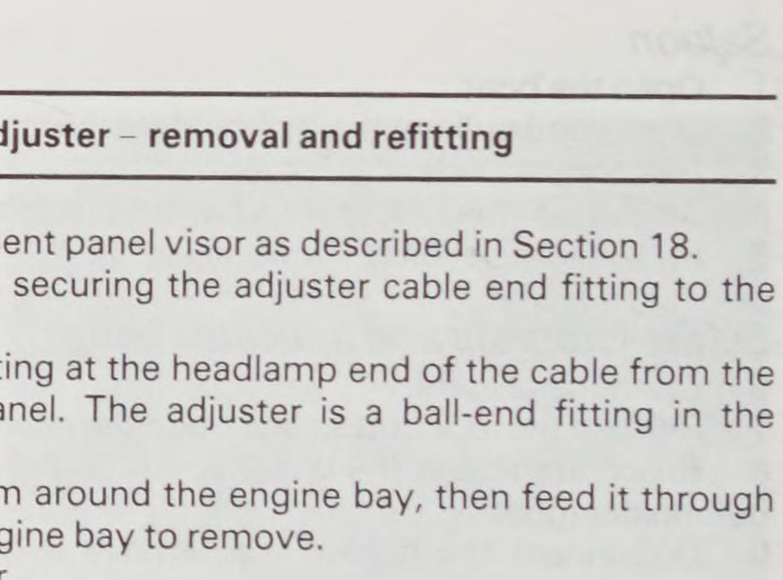
38.2 Removing number plate lamp bulb

39 Headlamp beam adjuster – removal and refitting

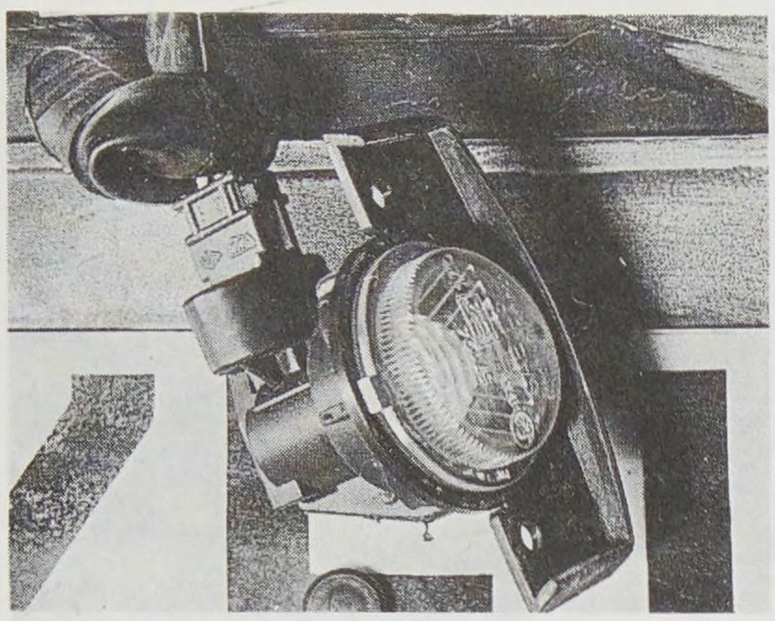
1 Remove the instrument panel visor as described in Section 18.
2 Remove the screws securing the adjuster cable end fitting to the facia (photo).
3 Turn and pull the fitting at the headlamp end of the cable from the bracket on the front panel. The adjuster is a ball-end fitting in the headlamp (photo).
4 Unclip the cable from around the engine bay, then feed it through the bulkhead into the engine bay to remove.
5 Refit in reverse order.

40 Headlamp beam adjustment – general

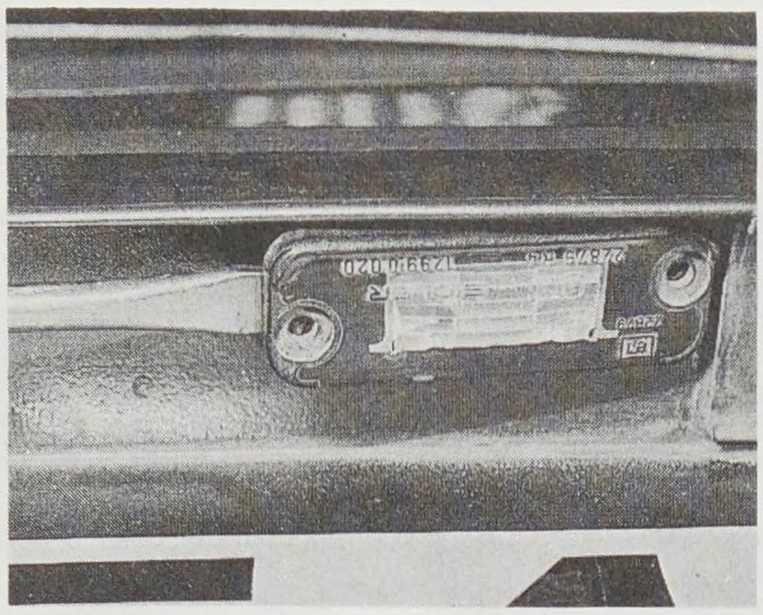
1 The correct setting of the headlamp beams should be entrusted to



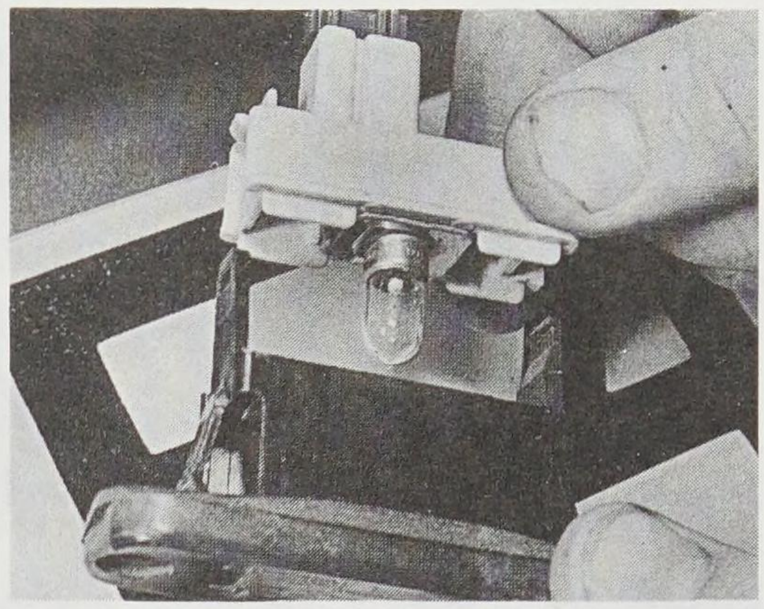
38.3A Lens retaining screws



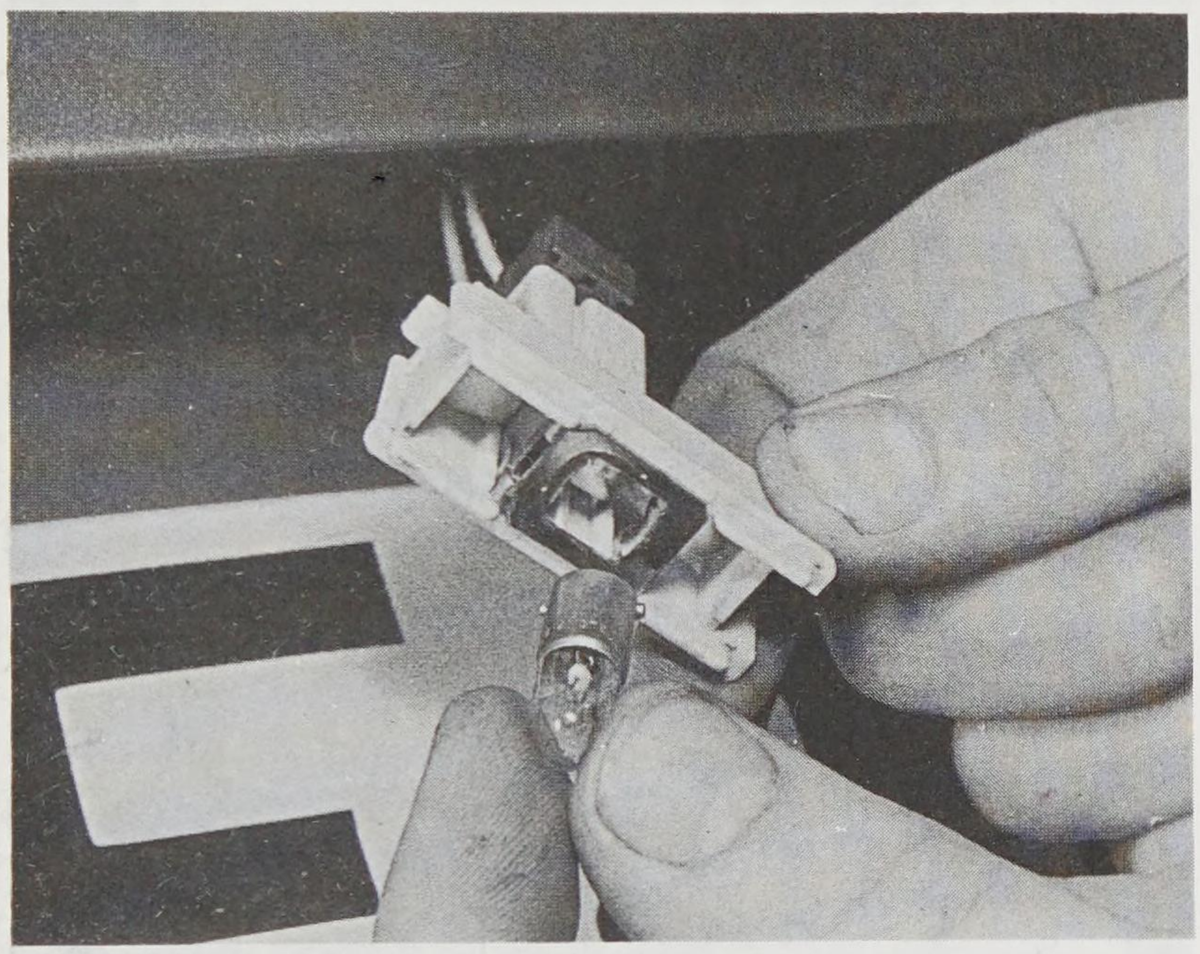
38.3B Lamp unit withdrawn showing electrical connections



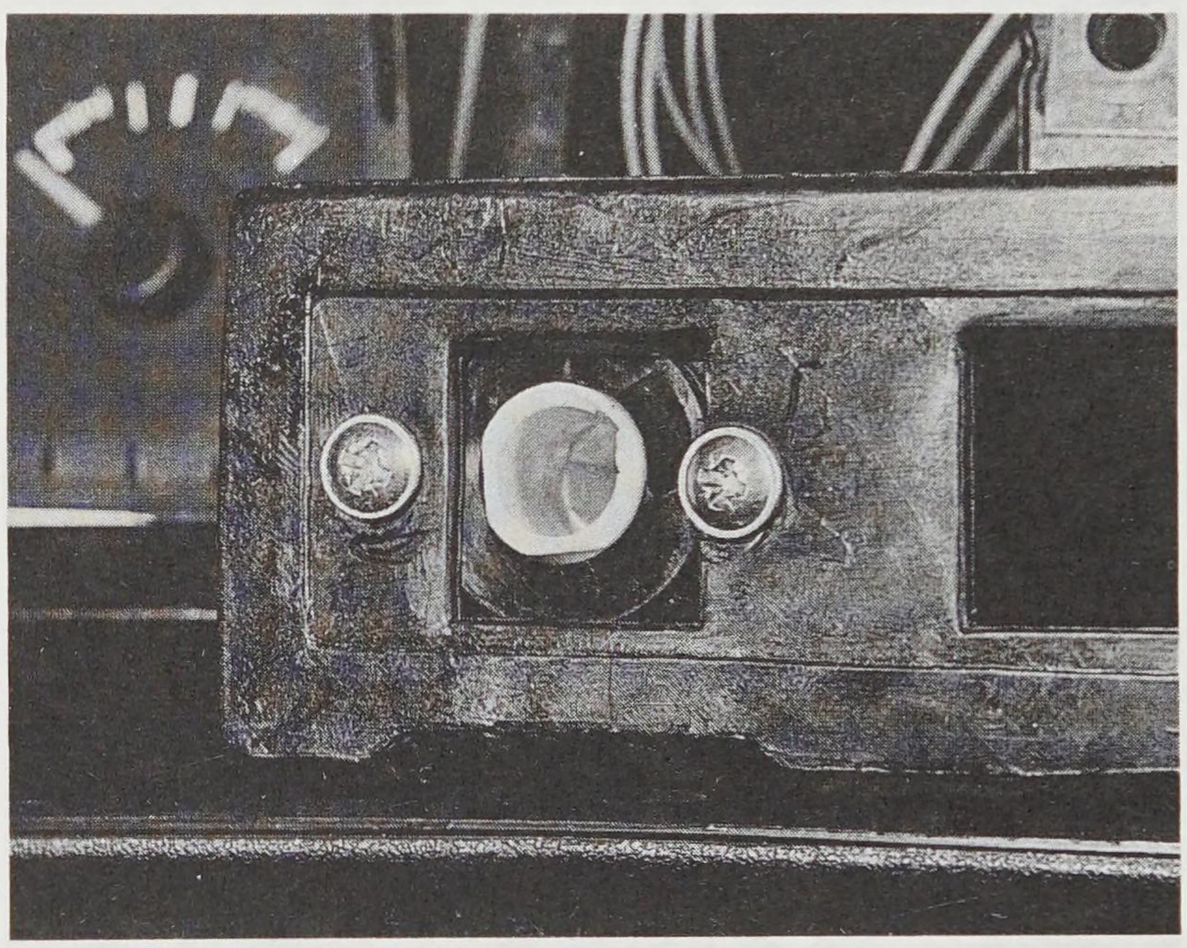
38.4 Prising out number plate lamp unit (Estate)



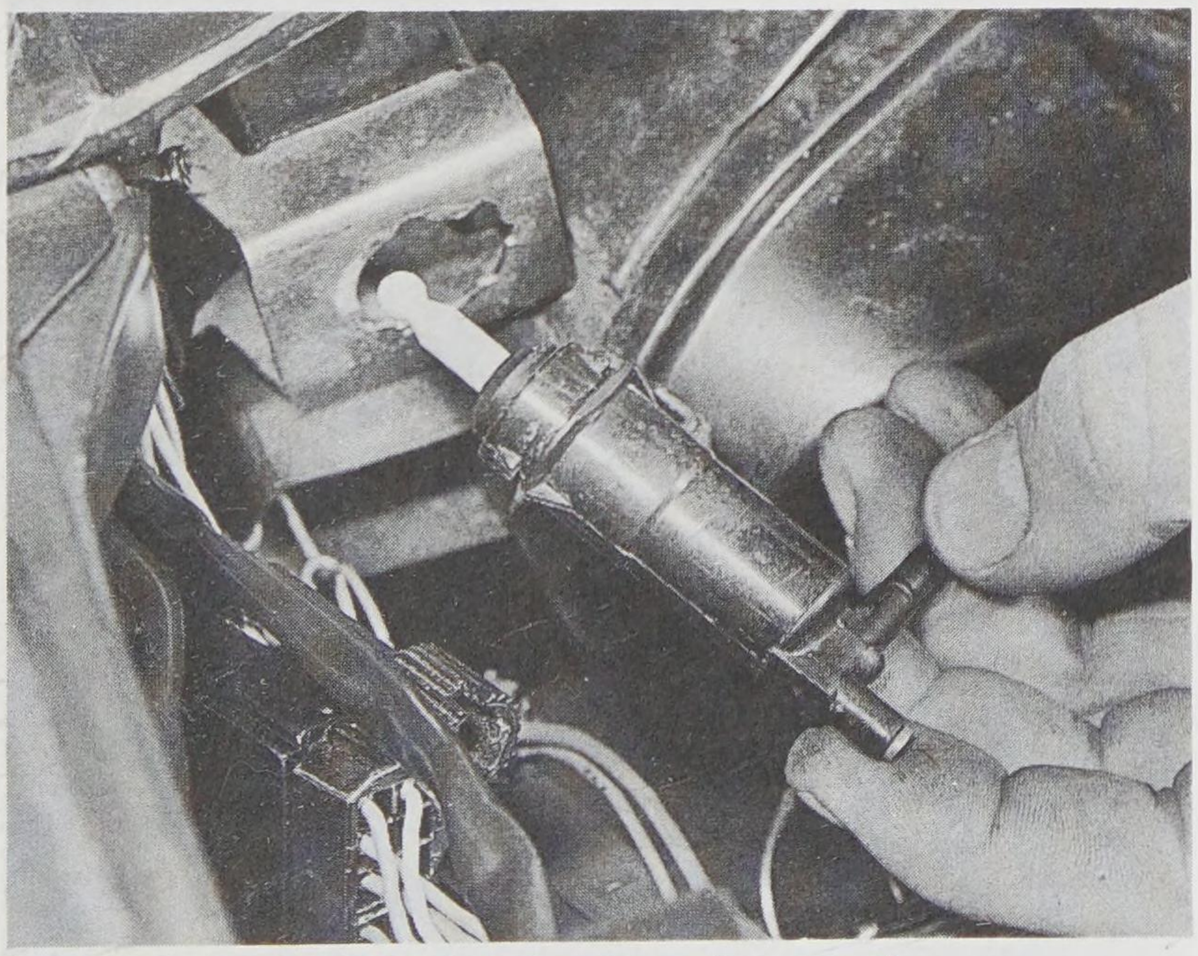
38.5 Unclipping the holder from the lens



38.6 Bulb is a bayonet fix



39.2 Adjuster cable end fitting screws



39.3 Removing the fitting from bracket on front panel

your local dealer, who has the necessary beam setting equipment. Badly adjusted headlamp beams can not only be an annoyance to other road users but may also be dangerous under certain conditions by causing unnecessary glare.

2 Where the headlamps are adjustable from inside the vehicle, remember to adjust the lamps when the rear of the vehicle is heavily laden.

41 Boot courtesy lamp (Saloon) – removal and refitting

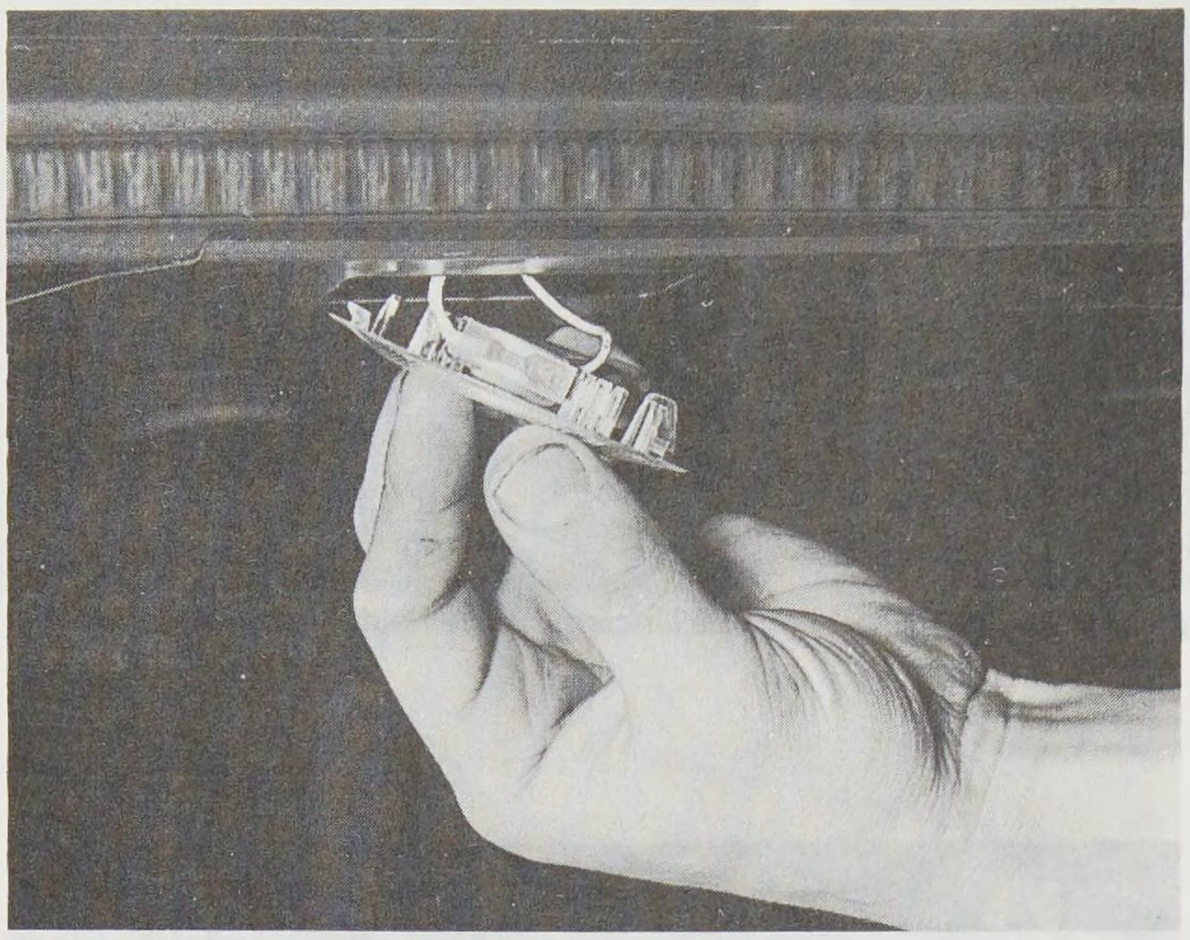
1 Open the boot and unclip the lamp unit from under the rear cross rail (photo).
2 The bulb is of festoon type held in the holder between two spring contacts.
3 Refit in reverse order.

42 Boot courtesy lamp switch (Saloon) – removal and refitting

1 Open the boot.
2 Unclip and pull the switch from its holder under the rear cross rail.
3 Disconnect the lead and withdraw the switch (photo).
4 Refit in reverse order.

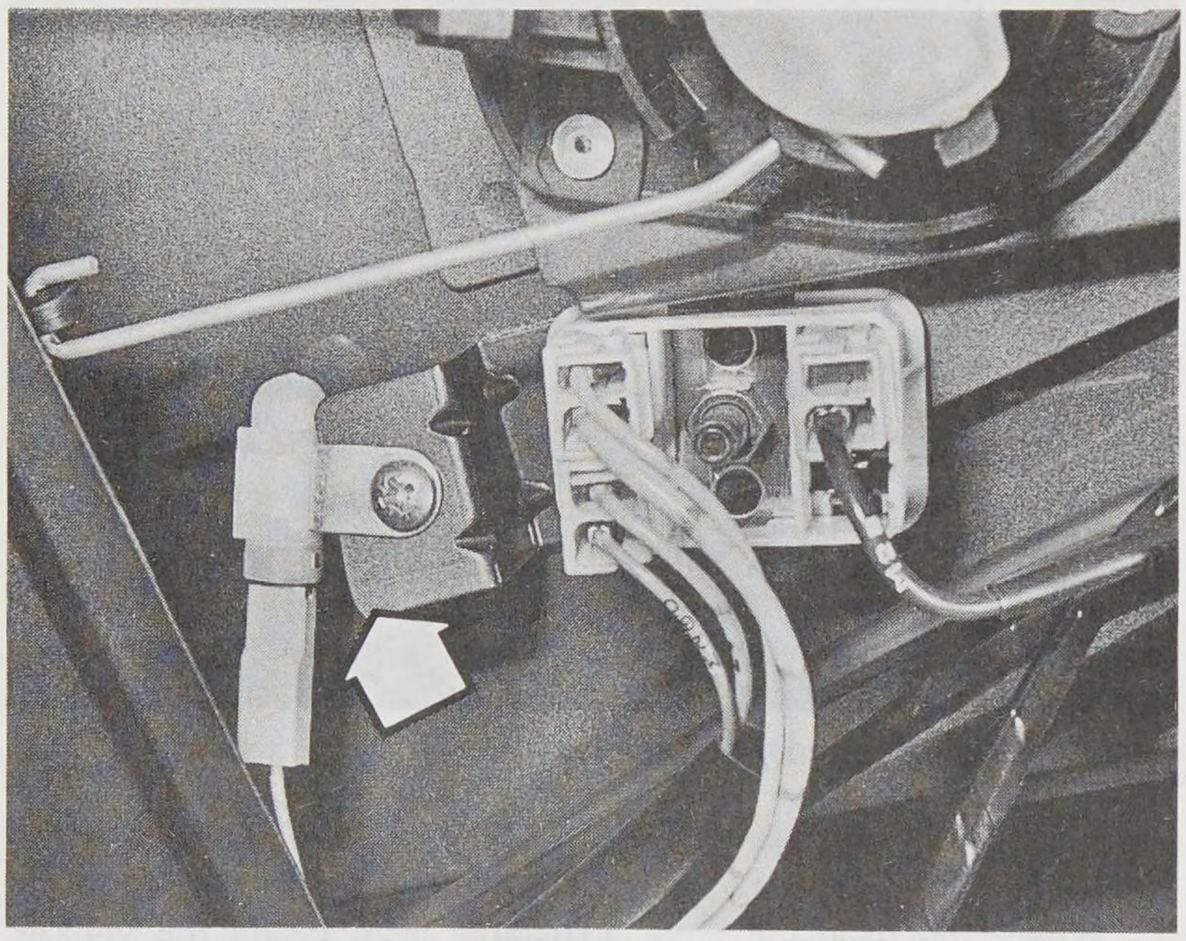
43 Tailgate courtesy lamp switch (Estate) – removal and refitting

1 The switch is a mercury capsule which completes the courtesy lamp circuit when the tailgate is in the open position.

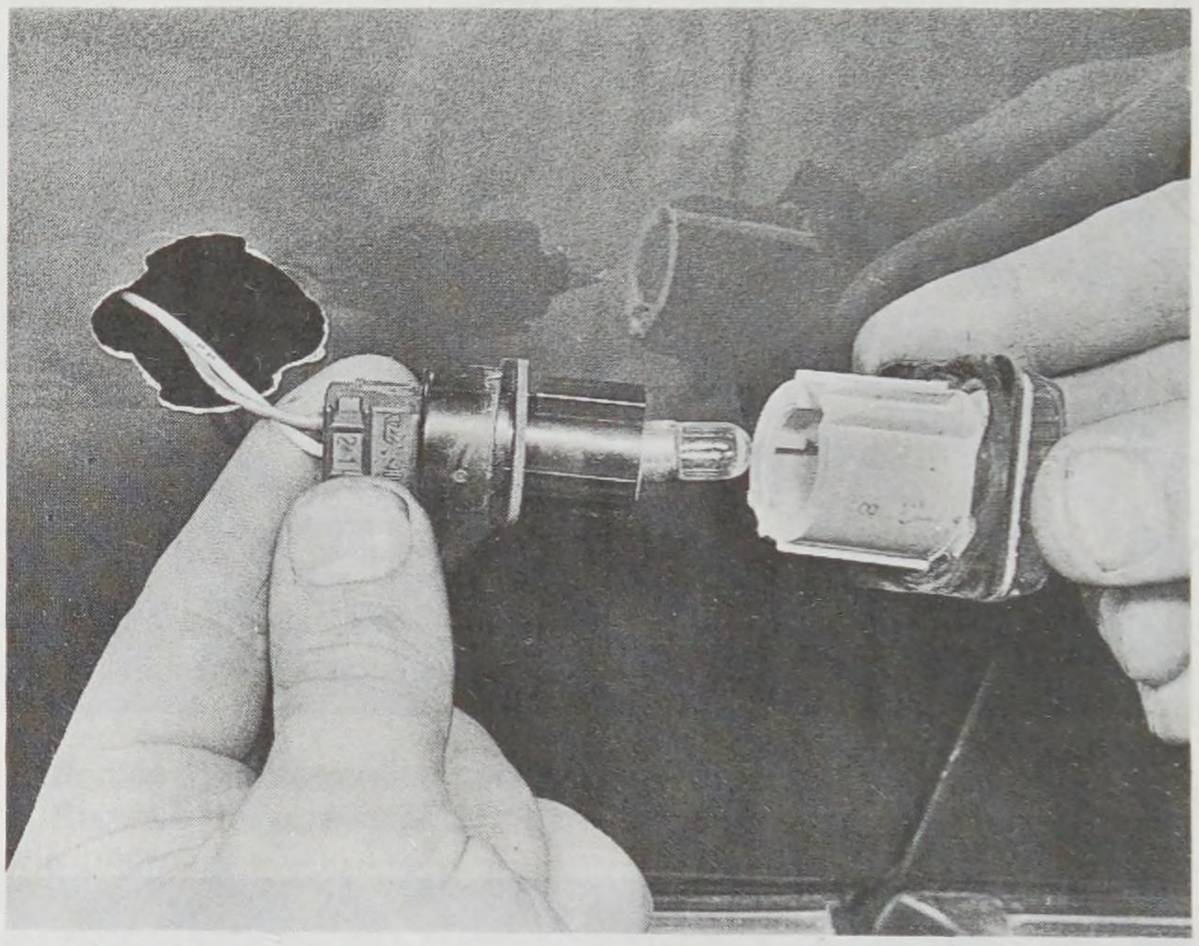


41.1 Courtesy lamp being removed (Saloon)

42.3 Removing the courtesy lamp switch



43.3 Tailgate courtesy lamp mercury switch (arrowed)



44.2 Side repeater lamp bulb

2 To renew the switch, first remove the tailgate trim panel as described in Chapter 11, Section 18.
3 Disconnect the switch and remove its securing screw (photo).
4 Fitting the new switch is a reversal of removal.
5 Dispose of the old switch safely.

44 Side repeater lamp – removal and refitting

1 Carefully pull or prise the lamp unit from the wing panel.
2 Pull the holder from the lens unit (photo).
3 The bulb is a push-fit in the holder.
4 Refit in reverse order.

45 Electric window switches – removal and refitting

Centre console front switches

1 Prise up and remove the panel at the bottom of the stowage space under the handbrake lever (photo).
2 Prise out the window switch cover plate (photo).
3 Prise out the switches and disconnect the leads (photo).

Centre console rear switches

4 Remove the rear ashtray.
5 Prise out the cover plate (photo).
6 Prise out the switches and disconnect the leads (photo).

Front and rear

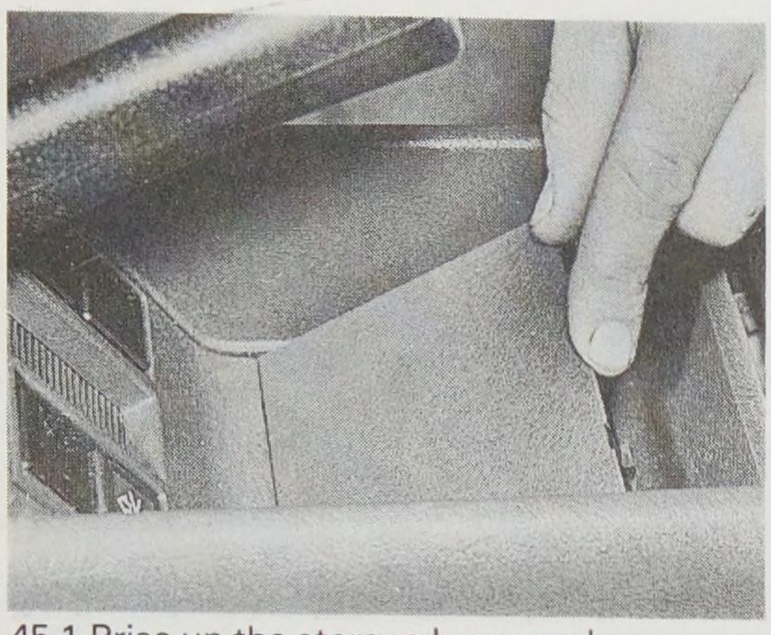
7 Refitting is a reversal of removal.

Armrest switches

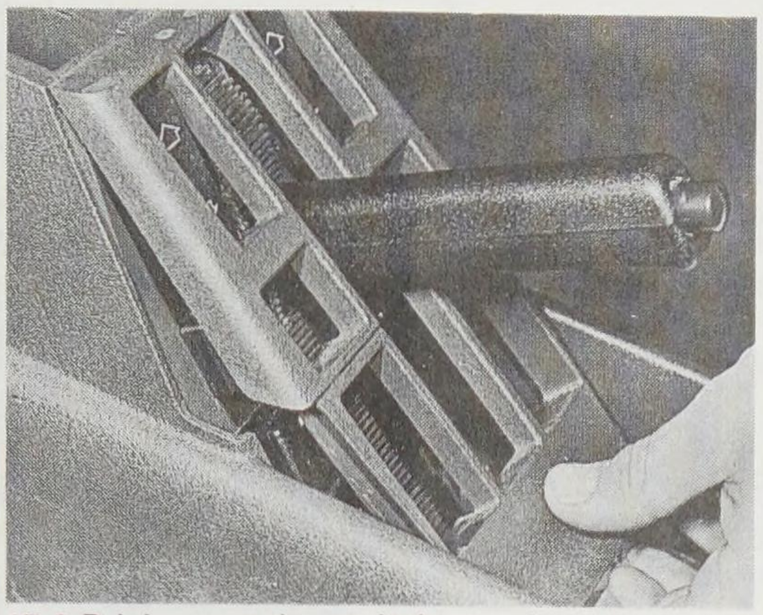
8 Refer to Chapter 12, Section 24.

46 Electric door mirror switches – removal and refitting

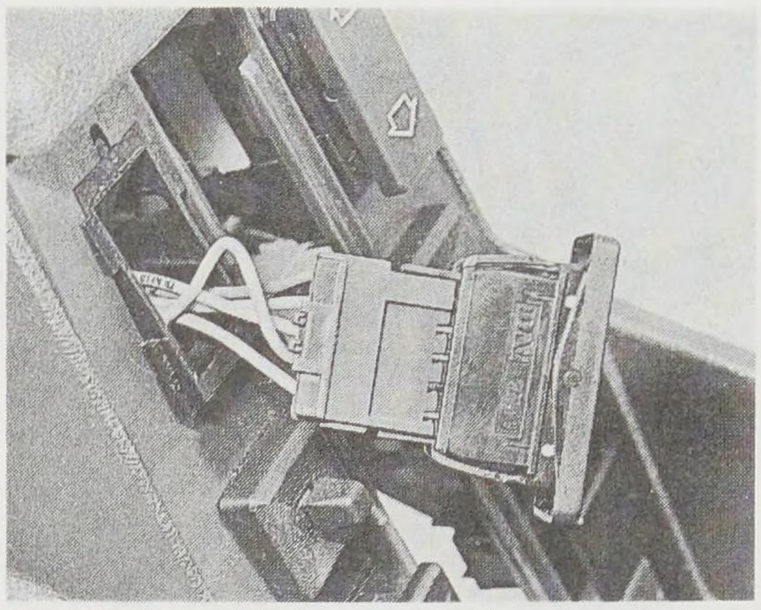
The procedure is as described for the window switches in Section 45.



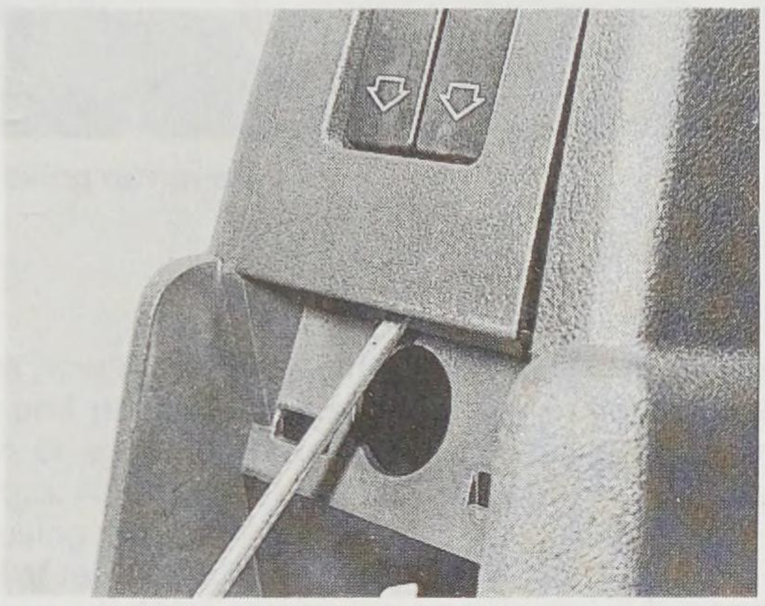
45.1 Prise up the storage box panel



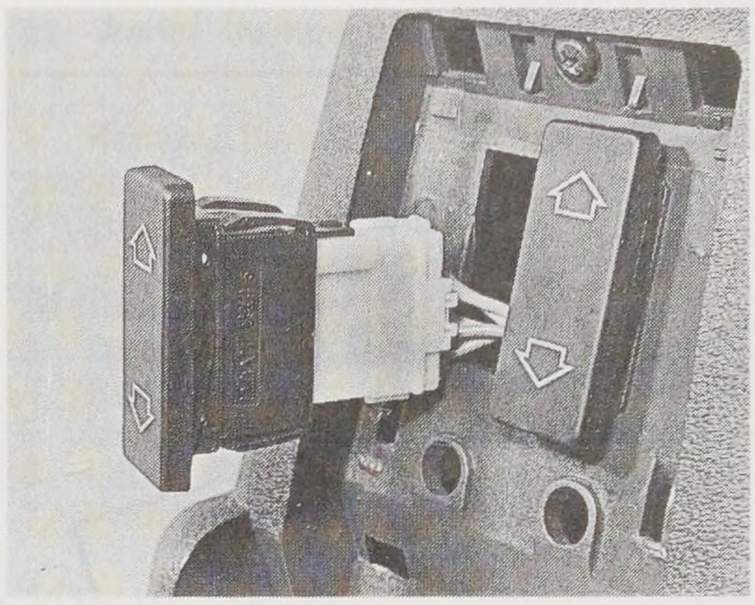
45.2 Prising out the switch panel



45.3 Switch withdrawn showing electrical connector



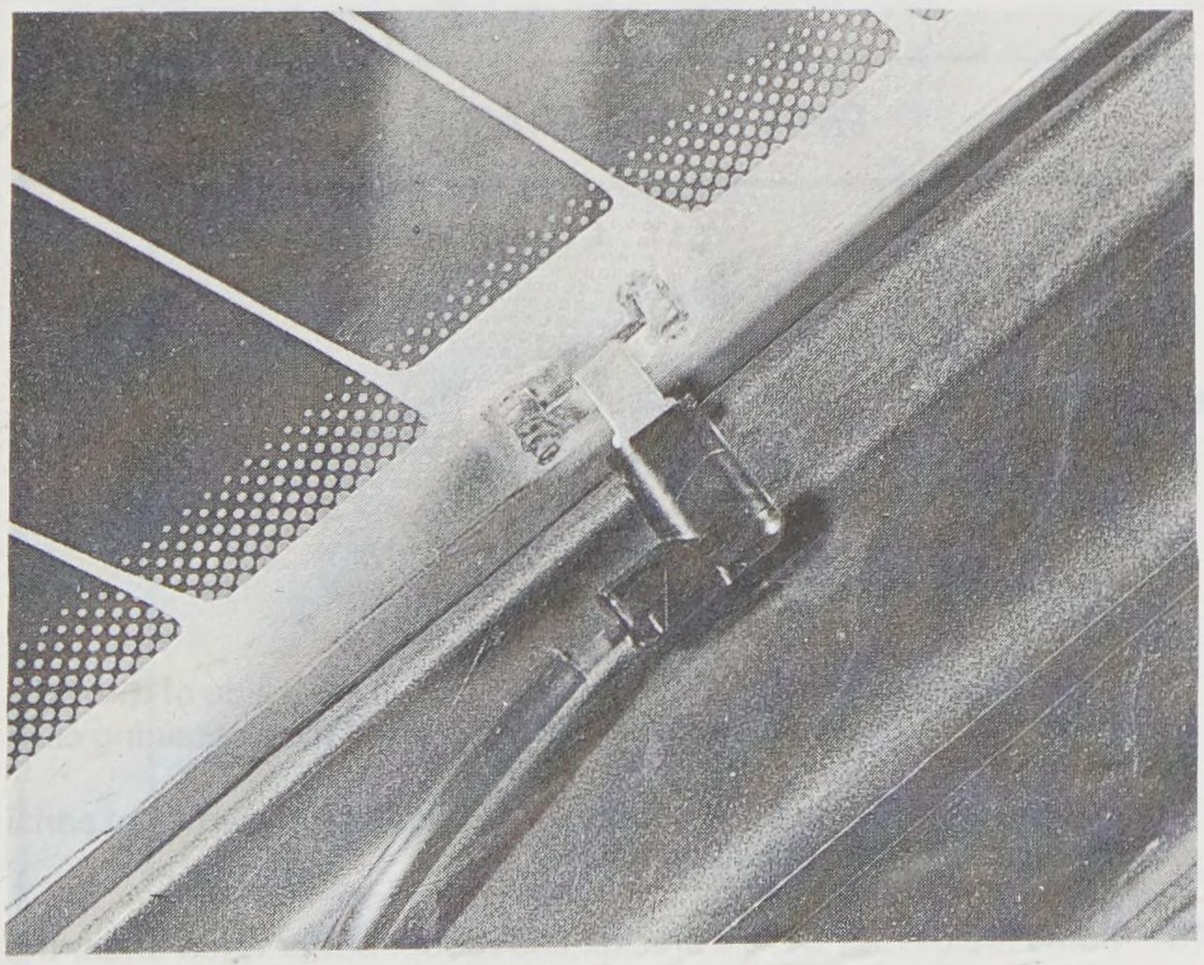
45.5 Prising off the cover from rear switches



45.6 Rear switch withdrawn showing electrical connector

47 Rear screen heater – general

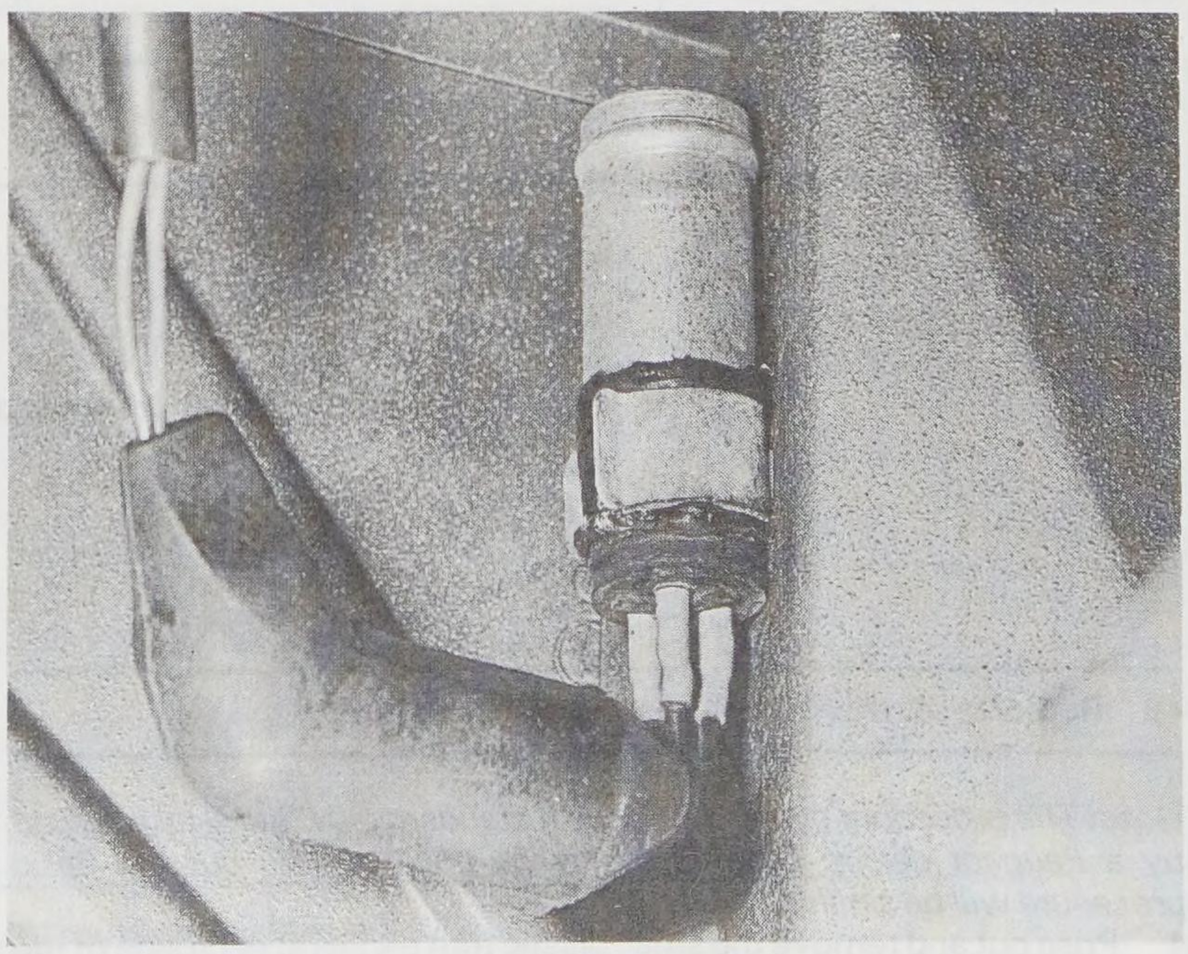
1 A rear screen heater is fitted to all models.
2 Connections are at each side of the screen (photo).
3 Care must be taken when cleaning the inside of the screen as the element is easily damaged.
4 Similarly, careless stowage of luggage can also scratch the element.
5 If the element is damaged, a proprietary 'paint-on' compound is available from accessory shops with which the break can be repaired.
6 The rear screen heater must not be left on any longer than is necessary to clear the screen as its current use is high, which can drain the battery.



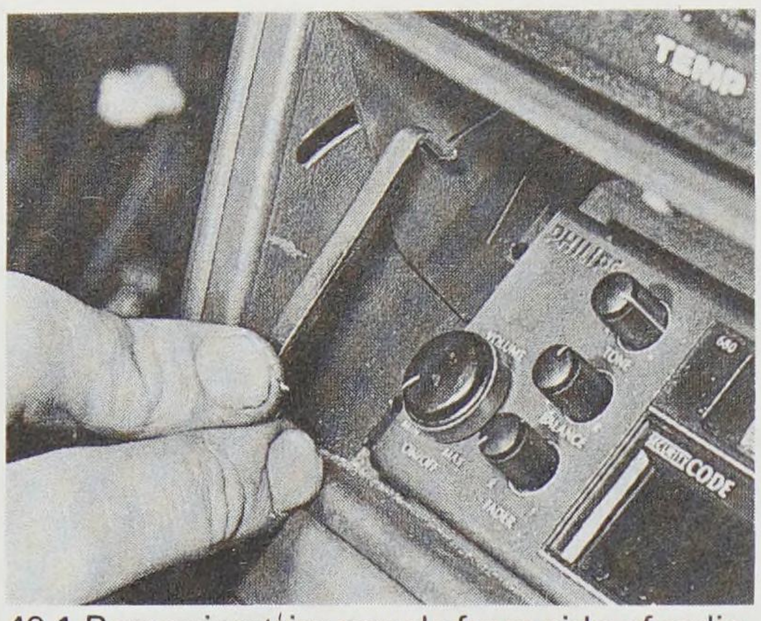
47.2 Rear screen heater connection

48 Dim-dip lighting system – general

1 A dim-dip lighting system is incorporated in the headlamp lighting circuit.
2 The system automatically switches the headlamps onto a power setting somewhat lower than normal dipped beam when the sidelamps are on and the ignition is switched on. This prevents the vehicle being driven on sidelamps only.
3 The dim-dip resistor is located under the front left-hand inner wheel arch (photo).
4 A dim-dip relay and diode are located in the relay box at the left-hand end of the scuttle.

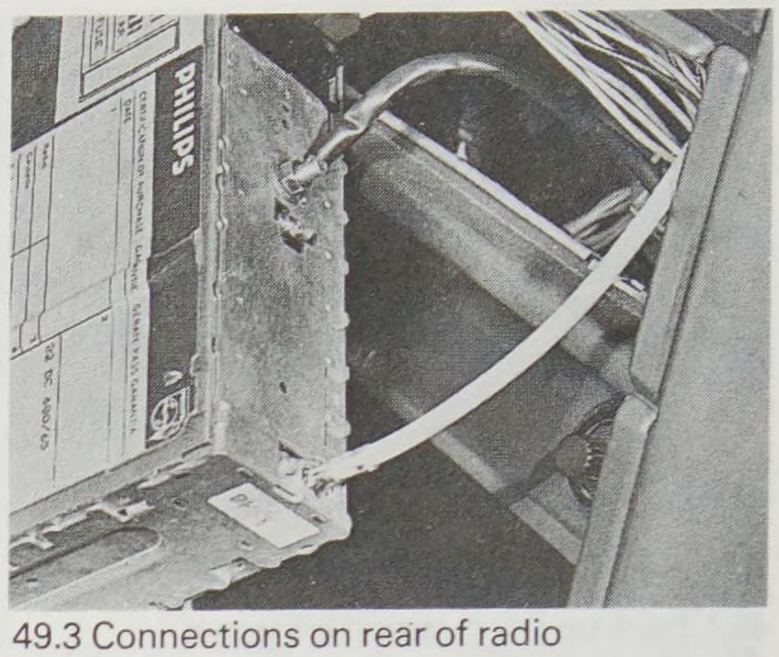


48.3 Dim-dip headlamp system resistor



49.1 Removing trim panels from side of radio

49.2 Radio removal tools inserted



49.3 Connections on rear of radio

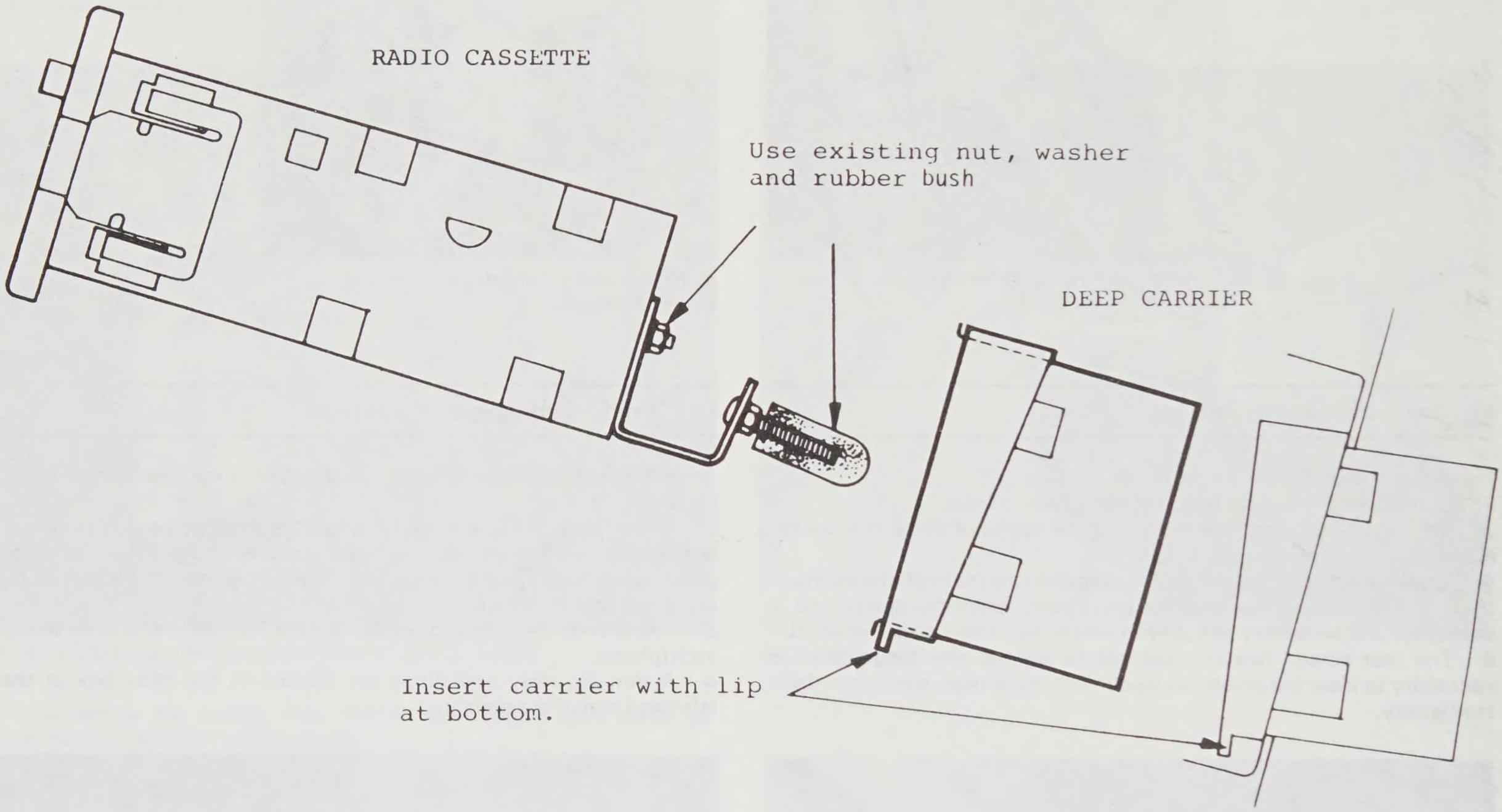


Fig 12.6 Bracket and rubber buffer on rear of radio/cassette player (Sec 49)

49 Radio/cassette player – removal and refitting

Note: *The procedure given here is for a standard DIN fitting as installed by a Peugeot dealer. Other fits may be encountered, but the basic procedure will be similar.*

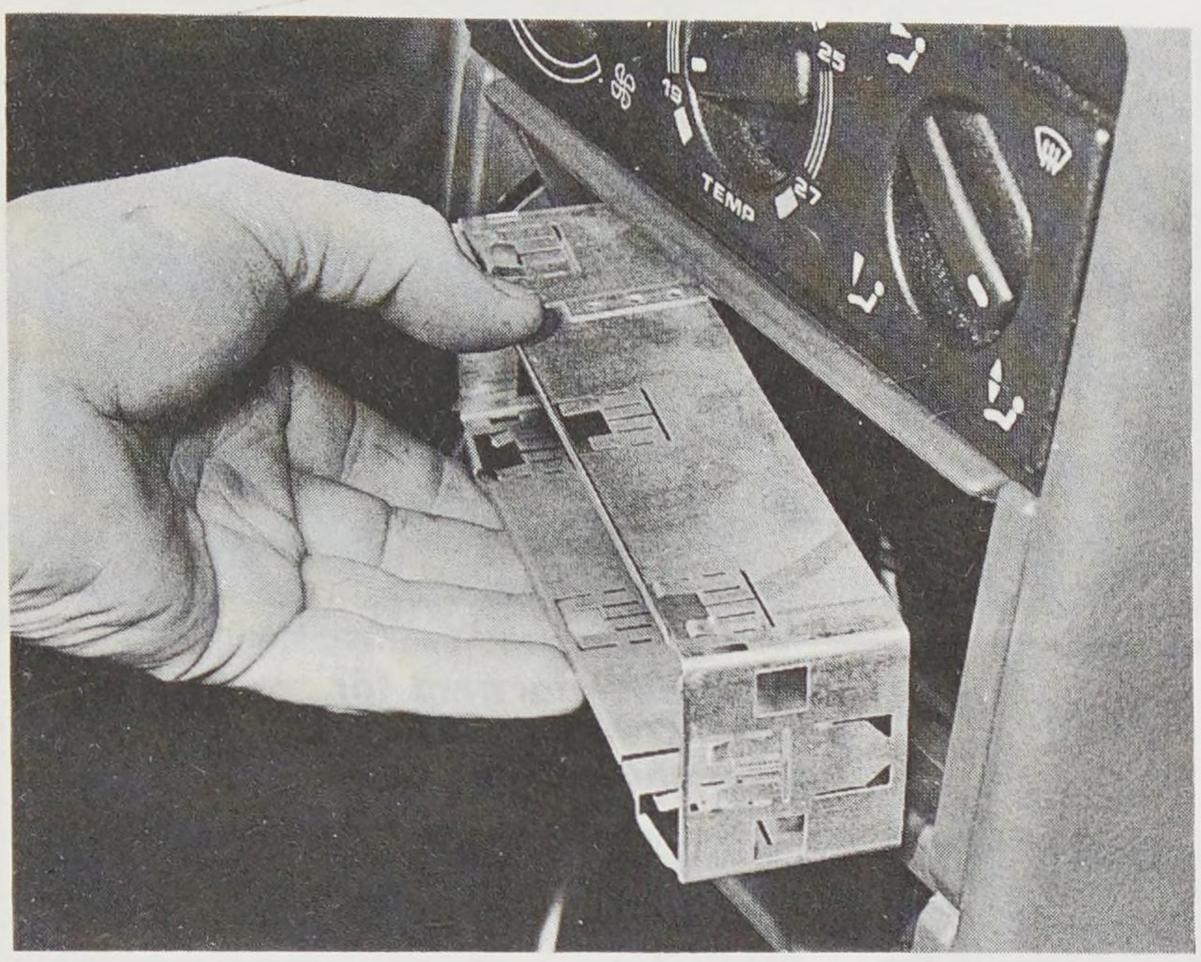
1 Prise out and remove the small plastic trim panels at each side of the radio (photo).

2 Insert the radio removal tools into the holes at each side of the radio until they lock into position (photo). In so doing the radio retaining clips are released.

3 Pull the radio forward sufficiently for the multi-plug, earth and aerial connections to be disconnected (photo).

4 Remove the radio.

5 Some radios may have a bracket and rubber buffer fitted under the earth lead connection (Fig. 12.6). If the radio is being renewed, transfer



49.5 Radio carrier frame being removed

these components to the new radio. The buffer sets the depth of the radio fit in the housing and prevents the security cover fouling the cassette during insertion or ejection. These parts are available from dealers if they are not fitted. Also transfer the tilt/carrier frame which is clipped into the radio housing (photo).

6 Refitting is a reversal of removal.

Note: *The multi-plug fitted to 1989 model year vehicles will not fit 1988 model year vehicles because of the locating lugs along the plug sides (Fig. 12.7). The lugs can be cut off to allow fitment.*

7 The cables in the radio/cassette aperture must be routed as shown in Fig. 12.8 and taped down to prevent them fraying on the radio.

50 Radio speakers – removal and refitting

Note: *This procedure covers only original equipment.*

Door speakers

1 Open the door.

2 Use a thin screwdriver to release the spring clip at front lower edge of speaker and remove the grille (photos).

3 Remove the screws (photo) and lift out the speaker.

4 Disconnect the speaker wires and remove the speaker (photo).

Tweeter speakers

5 Prise the grille from the facia (photo).

6 Remove the securing screws (photo) and lift out the speaker.

7 Disconnect the wires and remove the speaker.

Rear speakers (Saloon)

8 The speakers are located in the rear parcel shelf, access to their underside being through the boot space (photo).

9 Release the plastic clips, disconnect the wires and push the speaker up into the interior.

Rear speakers (Estate)

10 The speakers are located in the rear doors.

11 Removal is similar to front speakers.

All types

12 Refitting is a reversal of removal.

51 Aerial – removal and refitting

1 Remove the trim panels from the left-hand side of the boot/load space.

2 Fully retract the aerial.

Manual (Saloon)

3 Disconnect the aerial lead and earth wire (photo).

4 Remove the aerial bracket lower fixing bolt.

5 Unscrew the ring nut securing the aerial to the rear wing (photo).

6 Lift off the sealing grommet (photo).

7 Withdraw the aerial into the boot.

Manual (Estate)

8 The procedure is basically the same as for the Saloon, but the top fitting will be similar to that shown for the electric aerial.

Electric (Estate)

9 Disconnect the motor plug and aerial lead (photos). Where fitted, disconnect the earth lead.

10 Remove the motor bracket retaining bolt (photo).

11 Withdraw the motor and aerial into the load space (photo).

12 The aerial seal in the rear wing panel is a grommet type arrangement (photo).

Electric (Saloon)

13 The procedure is basically the same but the top fitting will be similar to that shown for the manual aerial.

All types

14 Refitting is a reversal of removal.

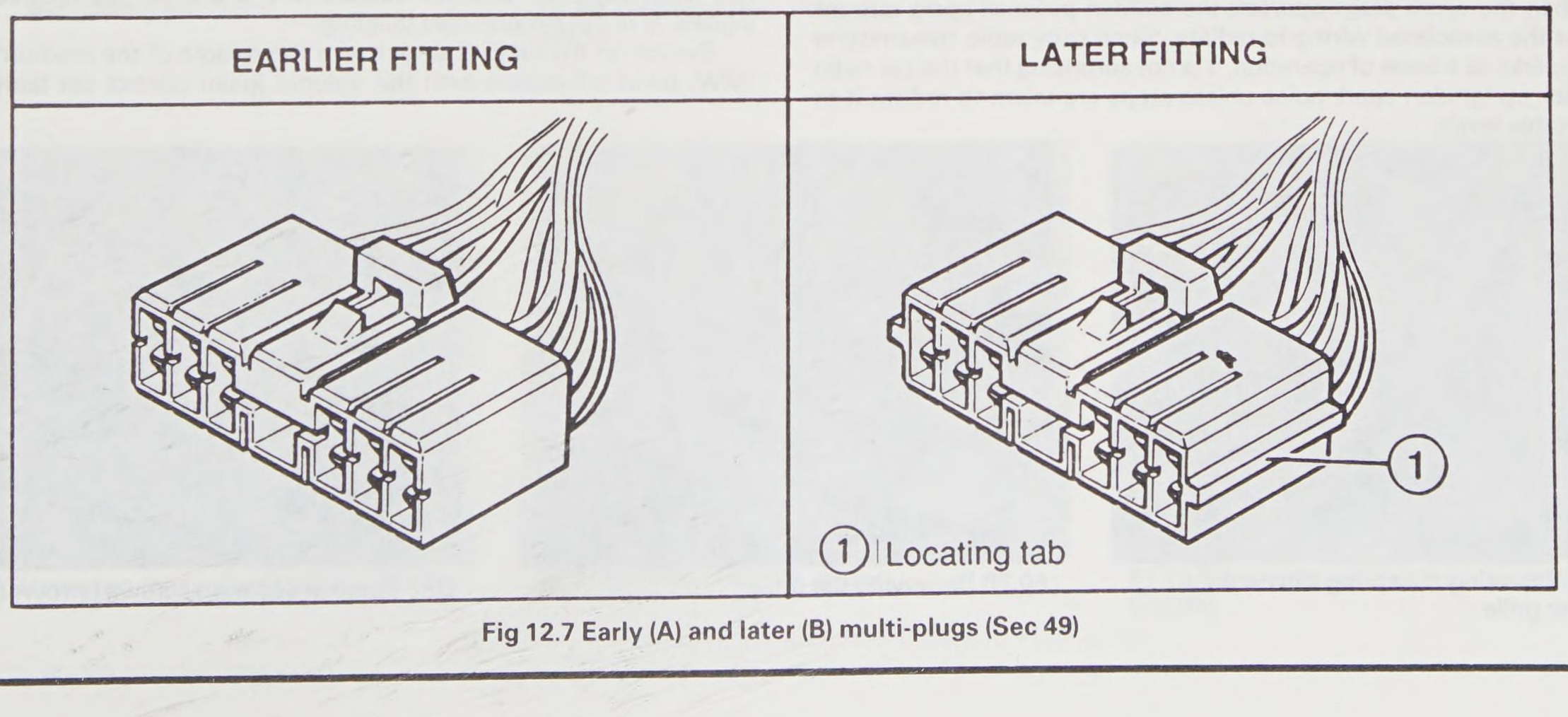


Fig 12.7 Early (A) and later (B) multi-plugs (Sec 49)

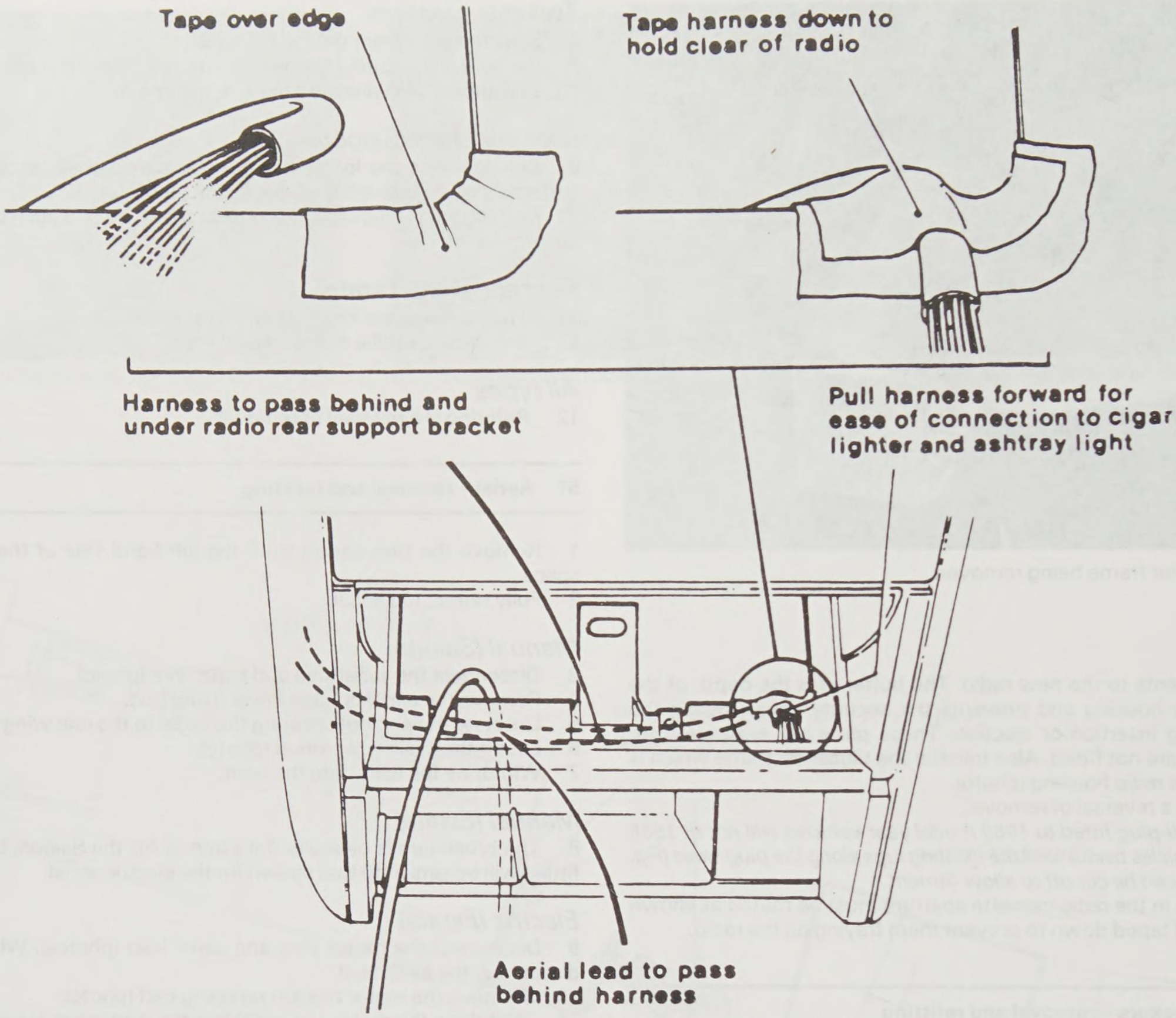


Fig 12.8 Routing of cables in centre console (Sec 49)

52 Mobile radio equipment – interference-free installation

Interference

In general, when electric current changes abruptly, unwanted electrical noise is produced. The motor vehicle is filled with electrical devices which change electric current rapidly, the most obvious being the contact breaker.

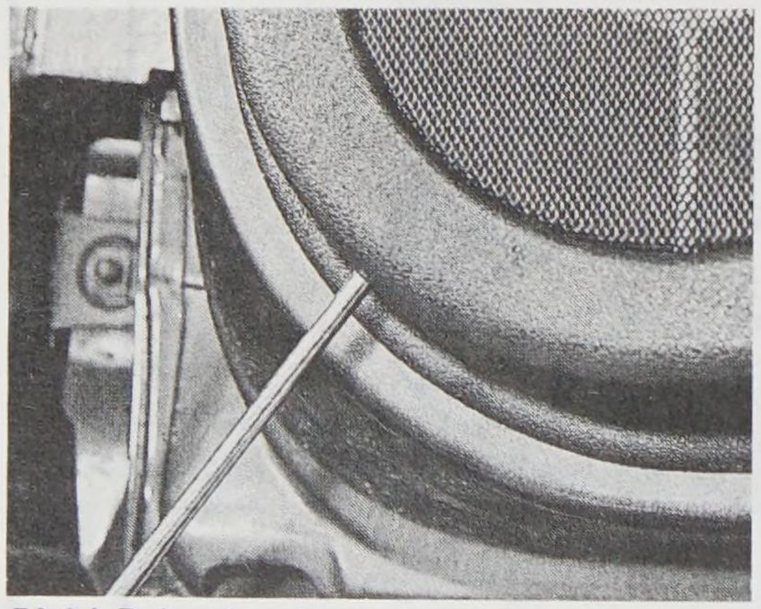
When the spark plugs operate, the sudden pulse of spark current causes the associated wiring to radiate. Since early radio transmitters used sparks as a basis of operation, it is not surprising that the car radio will pick up ignition spark noise unless steps are taken to reduce it to acceptable levels.

Interference reaches the car radio in two ways:

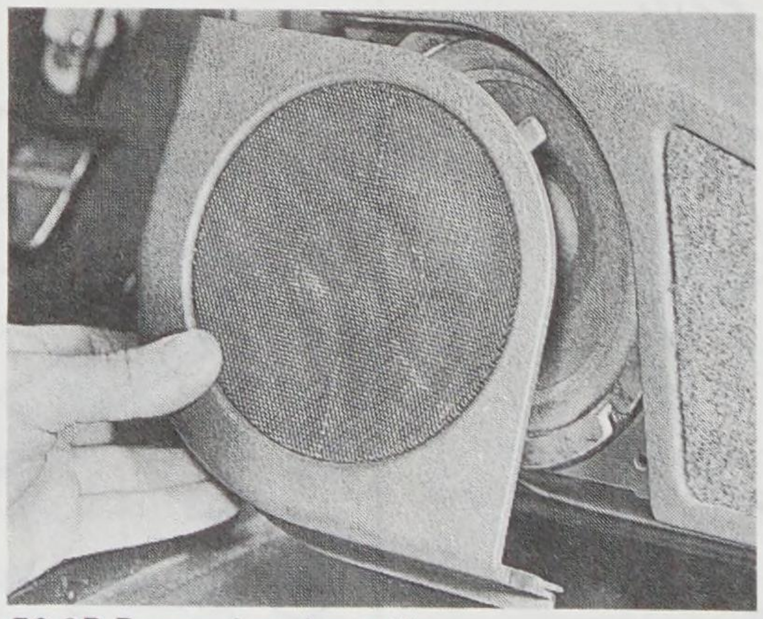
(a) by conduction through the wiring.
(b) by radiation to the receiving aerial.

Initial checks presuppose that the bonnet is down and fastened, the radio unit has a good earth connection (*not* through the aerial downlead outer), no fluorescent tubes are working near the car, the aerial trimmer has been adjusted, and the vehicle is in a position to receive radio signals, ie not in a metal-clad building.

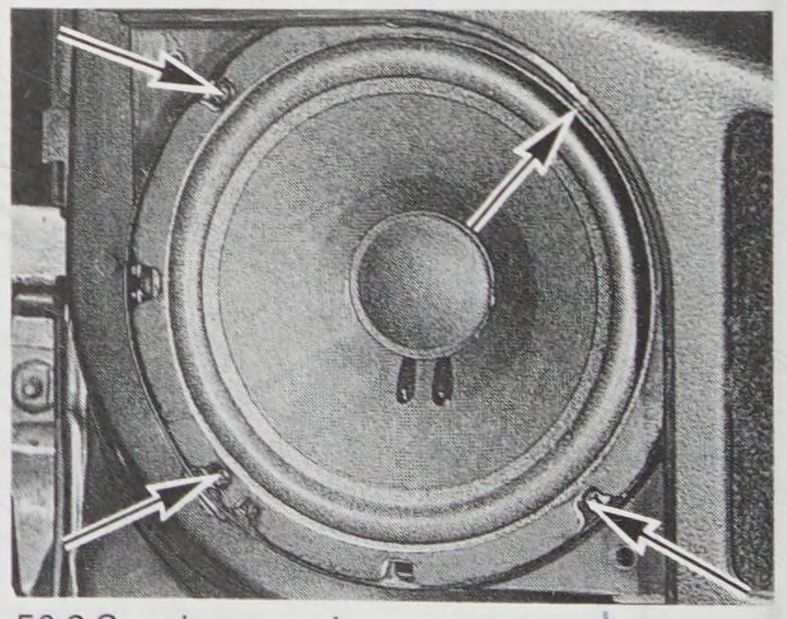
Switch on the radio and tune it to the middle of the medium wave (MW) band off-station with the volume (gain) control set fairly high.



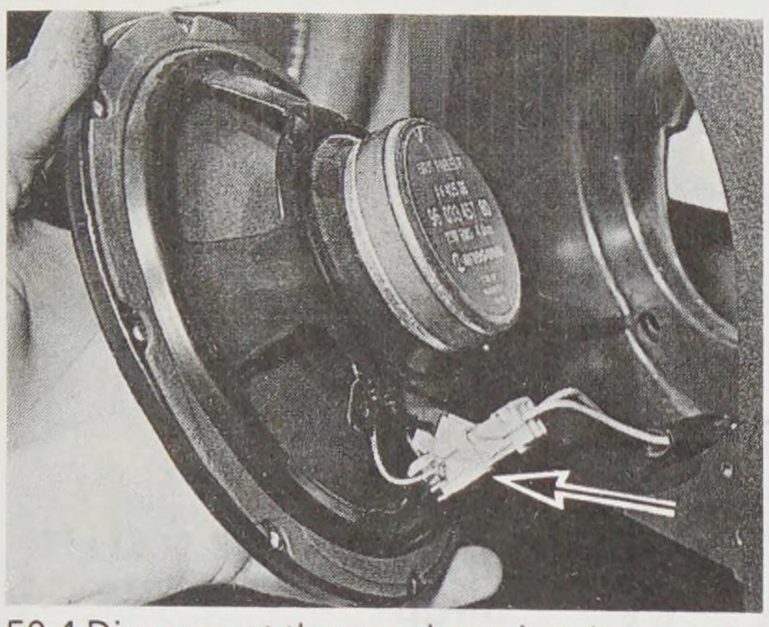
50.2A Releasing the spring clip on door speaker grille



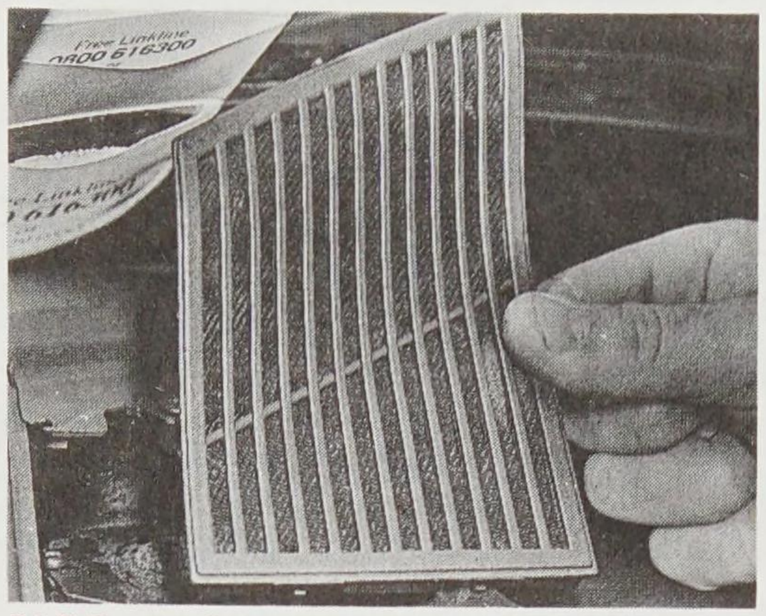
50.2B Removing the grille



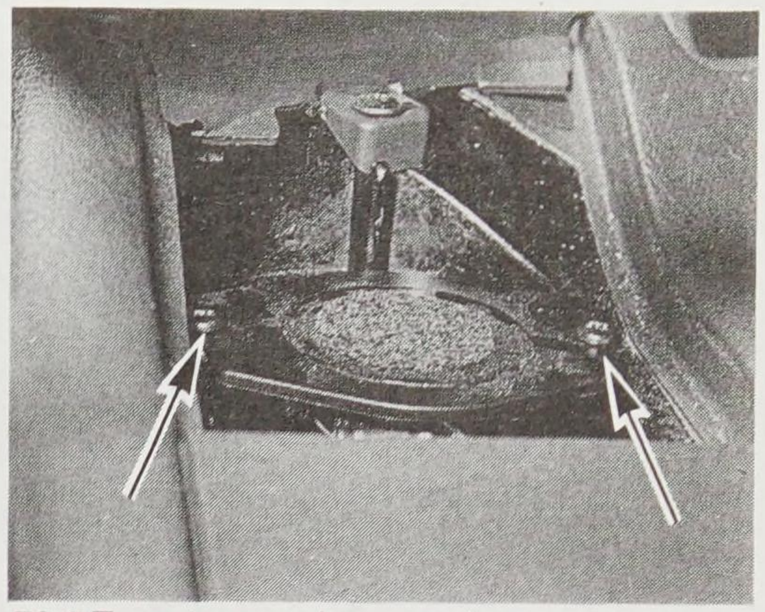
50.3 Speaker securing screws (arrowed)



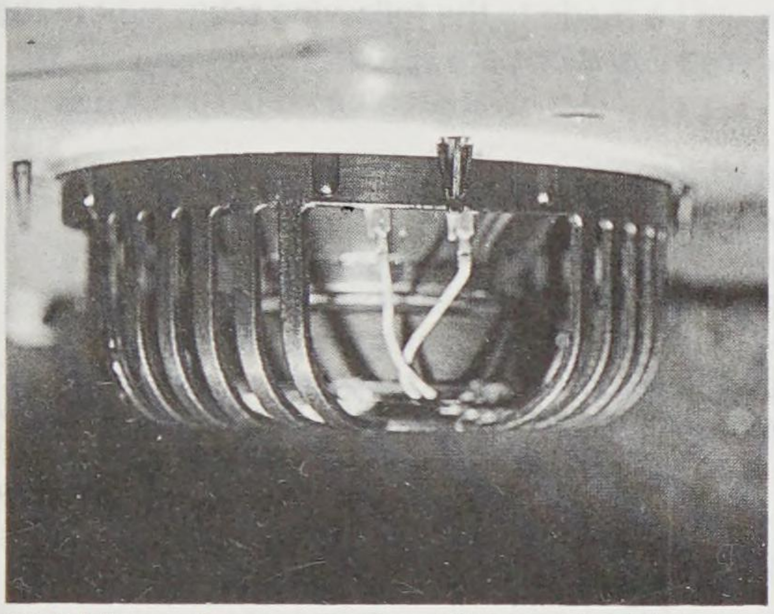
50.4 Disconnect the speaker wires (arrowed)



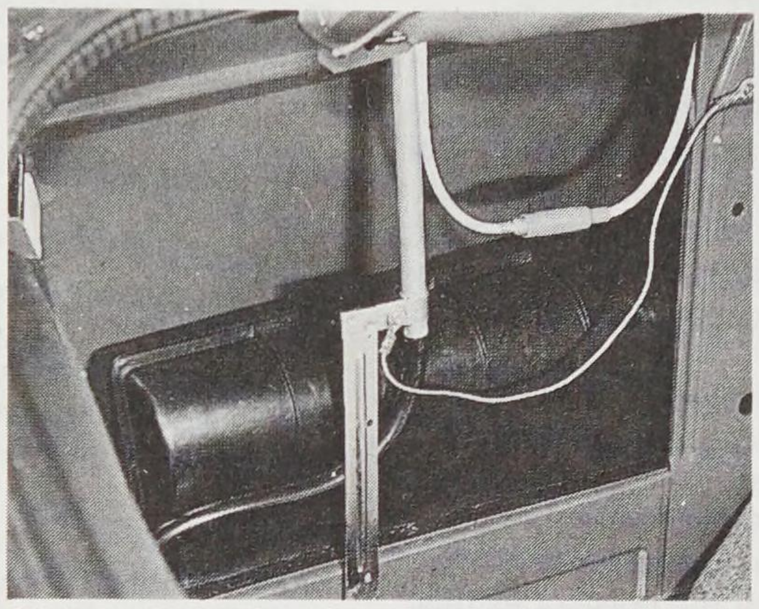
50.5 Removing a tweeter speaker grille



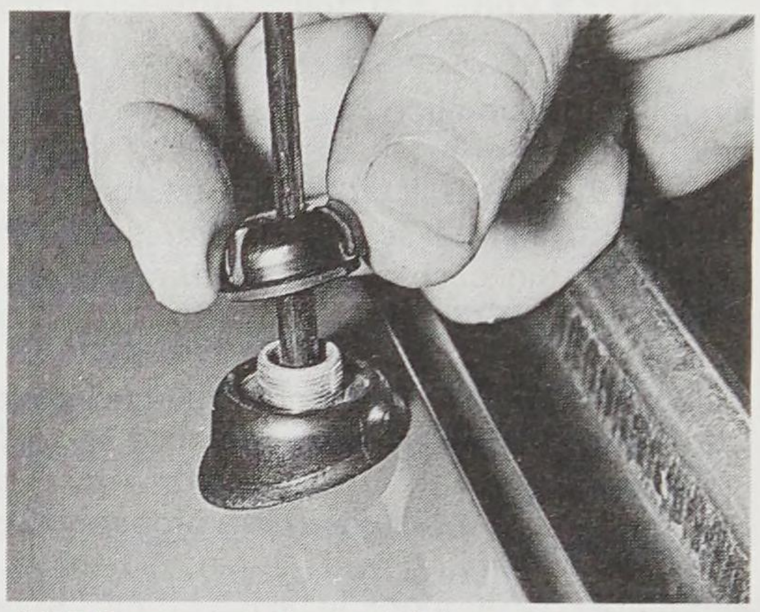
50.6 Tweeter speaker securing screws (arrowed)



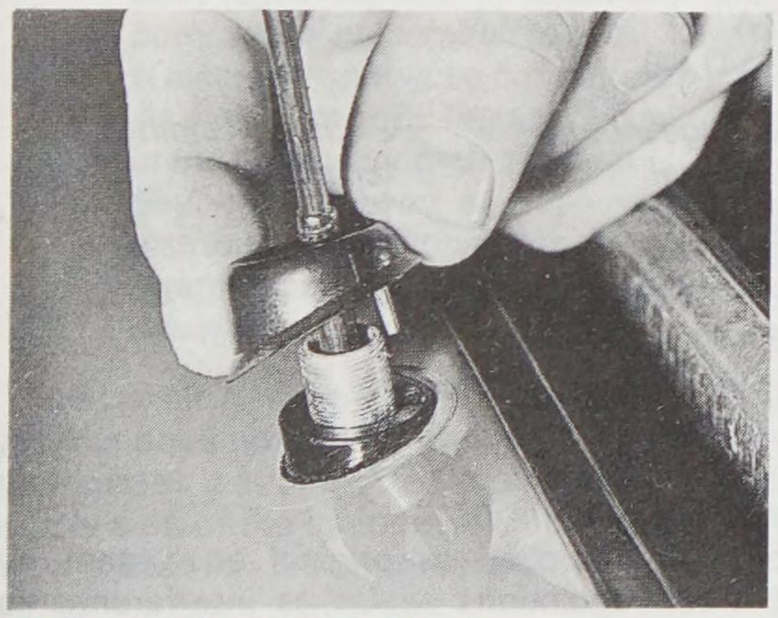
50.8 View of rear speaker (Saloon) inside boot space



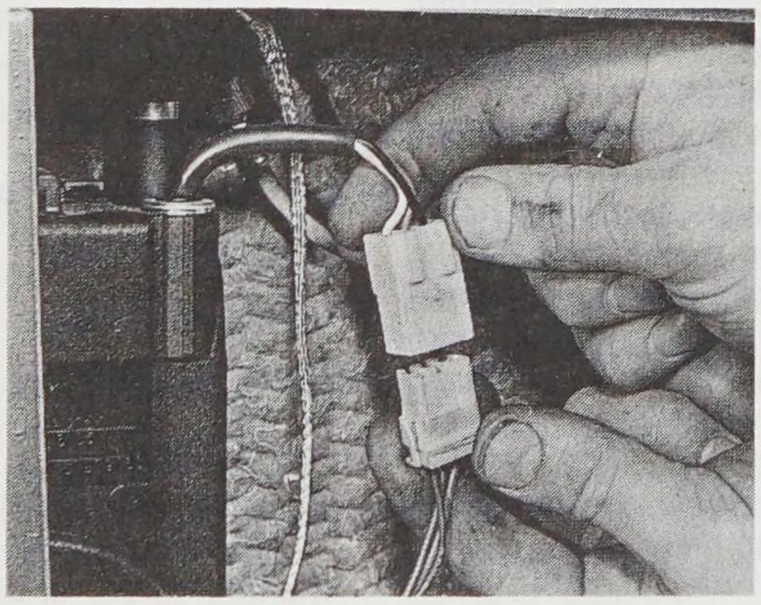
51.3 Aerial lead and earth wire (manual)



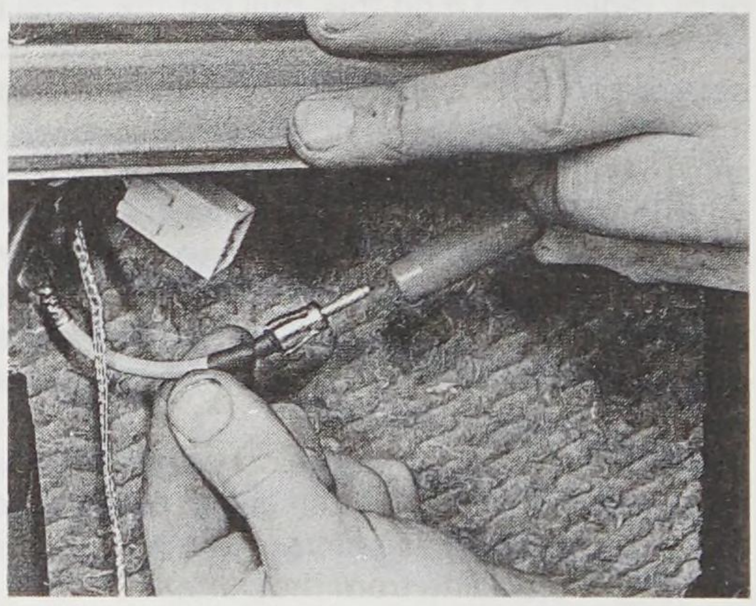
51.5 Removing the aerial ring nut ...



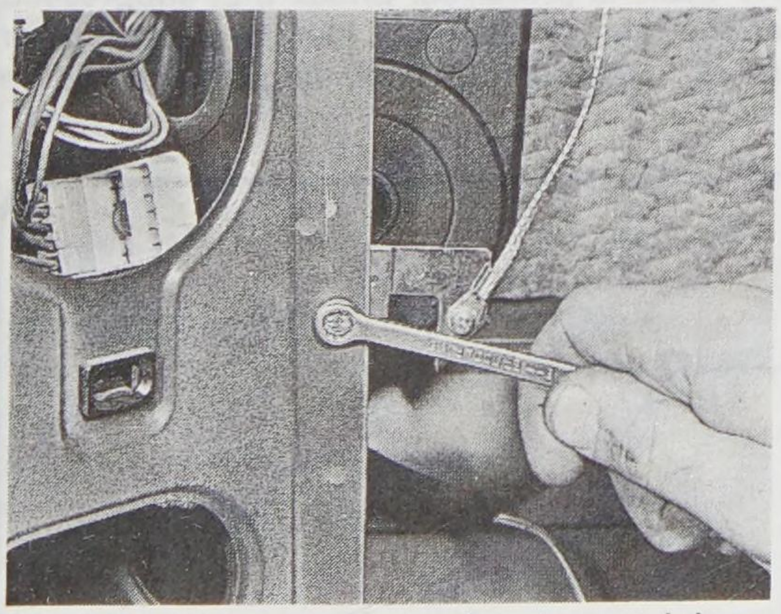
51.6 ... and sealing grommet



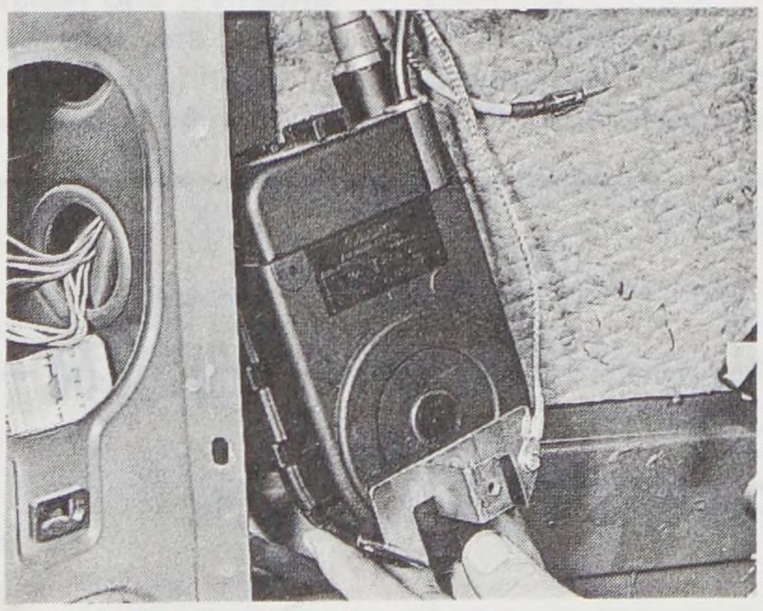
51.9A Disconnecting the motor plug (electric aerial) ...



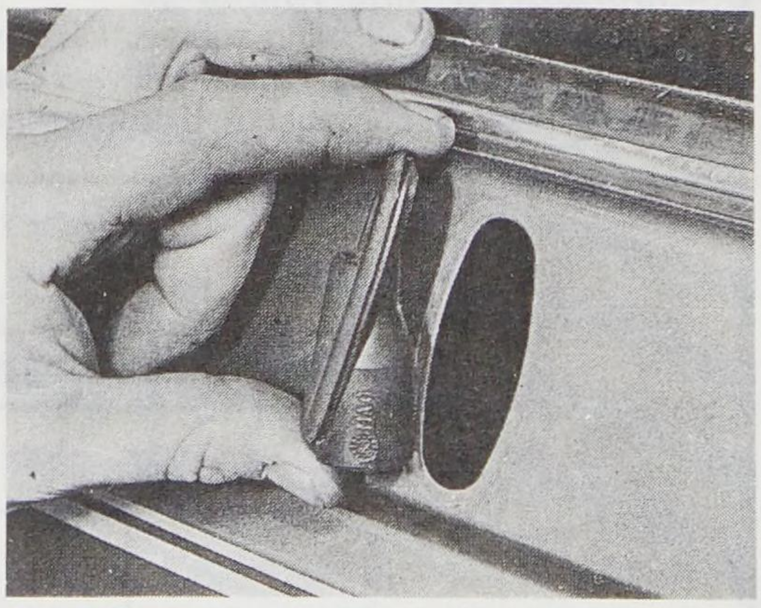
51.9B ... and aerial lead



51.10 Removing the motor bracket retaining bolt



51.11 Withdrawing the motor



51.12 Removing aerial seal in rear wing panel (Estate)

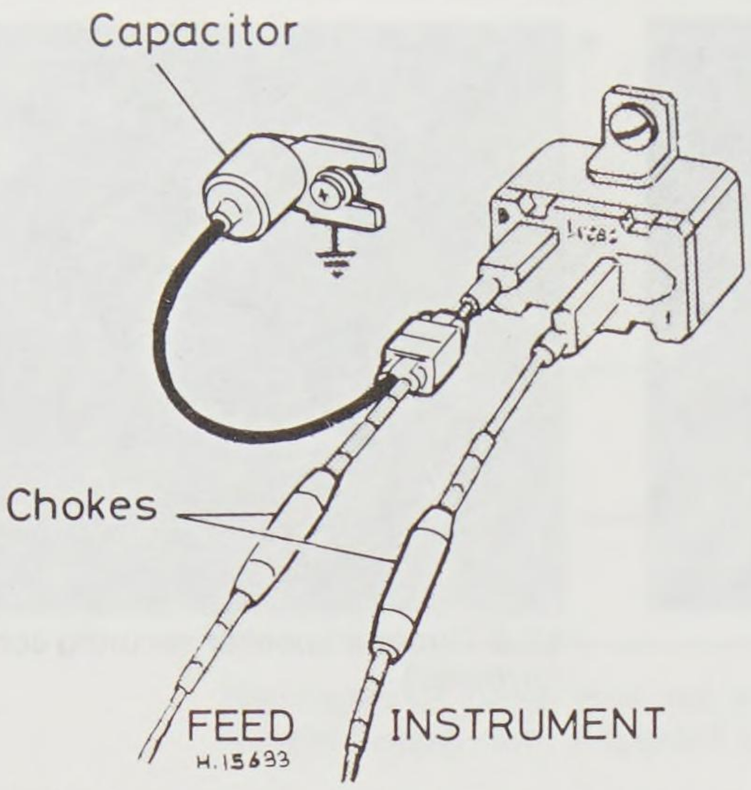


Fig 12.9 Voltage stabiliser interference suppression (Sec 52)

Switch on the ignition (but do not start the engine) and wait to see if irregular clicks or hash noise occurs. Tapping the facia panel may also produce the effects. If so, this will be due to the voltage stabiliser, which is an on-off thermal switch to control instrument voltage. It is located usually on the back of the instrument panel, often attached to the speedometer. Correction is by attachment of a capacitor and, if still troublesome, chokes in the supply wires.

Switch on the engine and listen for interference on the MW band. Depending on the type of interference, the indications are as follows.

A harsh crackle that drops out abruptly at low engine speed or when the headlights are switched on is probably due to a voltage regulator.

A whine varying with engine speed is due to the dynamo or alternator. Try temporarily taking off the fan belt – if the noise goes this is confirmation.

Regular ticking or crackle that varies in rate with the engine speed is due to the ignition system. With this trouble in particular and others in general, check to see if the noise is entering the receiver from the wiring or by radiation. To do this, pull out the aerial plug, (preferably shorting out the input socket or connecting a 62 pF capacitor across it). If the noise disappears it is coming in through the aerial and is *radiation noise.* If the noise persists it is reaching the receiver through the wiring and is said to be *line-borne.*

Interference from wipers, washers, heater blowers, turn-indicators, stop lamps, etc is usually taken to the receiver by wiring, and simple treatment using capacitors and possibly chokes will solve the problem. Switch on each one in turn (wet the screen first for running wipers!) and listen for possible interference with the aerial plug in place and again when removed.

Electric petrol pumps are now finding application again and give rise to an irregular clicking, often giving a burst of clicks when the ignition is on but the engine has not yet been started. It is also possible to receive whining or crackling from the pump.

Note that if most of the vehicle accessories are found to be creating interference all together, the probability is that poor aerial earthing is to blame.

Component terminal markings

Throughout the following sub-sections reference will be found to various terminal markings. These will vary depending on the manufacturer of the relevant component. If terminal markings differ from those mentioned, reference should be made to the following table, where the most commonly encountered variations are listed.

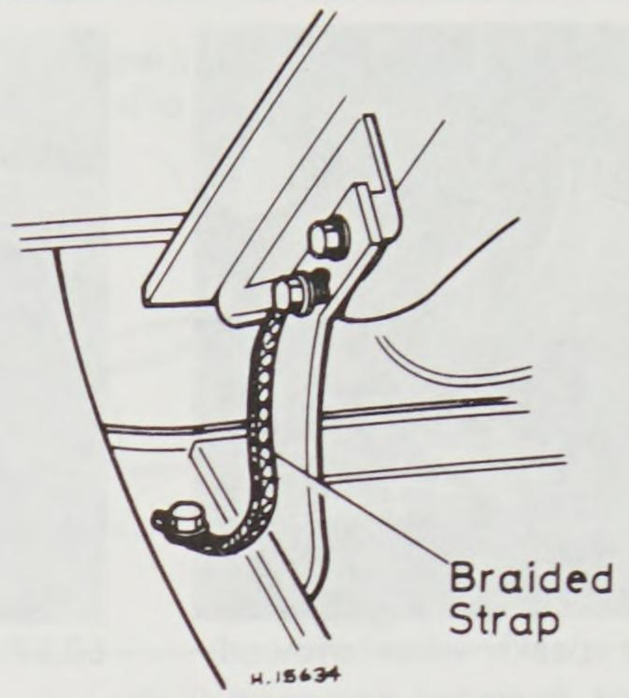


Fig 12.10 Braided earth strap between bonnet and body (Sec 52)

Alternator	*Alternator terminal (thick lead)*	*Exciting winding terminal*
DIN/Bosch	B +	DF
Delco Remy	+	EXC
Ducellier	+	EXC
Ford (US)	+	DF
Lucas	+	F
Marelli	+ B	F
Ignition coil	*Ignition switch terminal*	*Contact breaker terminal*
DIN/Bosch	15	1
Delco Remy	+	–
Ducellier	BAT	RUP
Ford (US)	B/+	CB/–
Lucas	SW/+	–
Marelli	BAT/+B	D
Voltage regulator	*Voltage input terminal*	*Exciting winding terminal*
DIN/Bosch	B+/D+	DF
Delco Remy	BAT/+	EXC
Ducellier	BOB/BAT	EXC
Ford (US)	BAT	DF
Lucas	+/A	F
Marelli		F

Suppression methods – ignition

Suppressed HT cables are supplied as original equipment by manufacturers and will meet regulations as far as interference to neighbouring equipment is concerned. It is illegal to remove such suppression unless an alternative is provided, and this may take the form of resistive spark plug caps in conjunction with plain copper HT cable. For VHF purposes, these and 'in-line' resistors may not be effective, and resistive HT cable is preferred. Check that suppressed cables are actually fitted by observing cable identity lettering, or measuring with an ohmmeter – the value of each plug lead should be 5000 to 10 000 ohms.

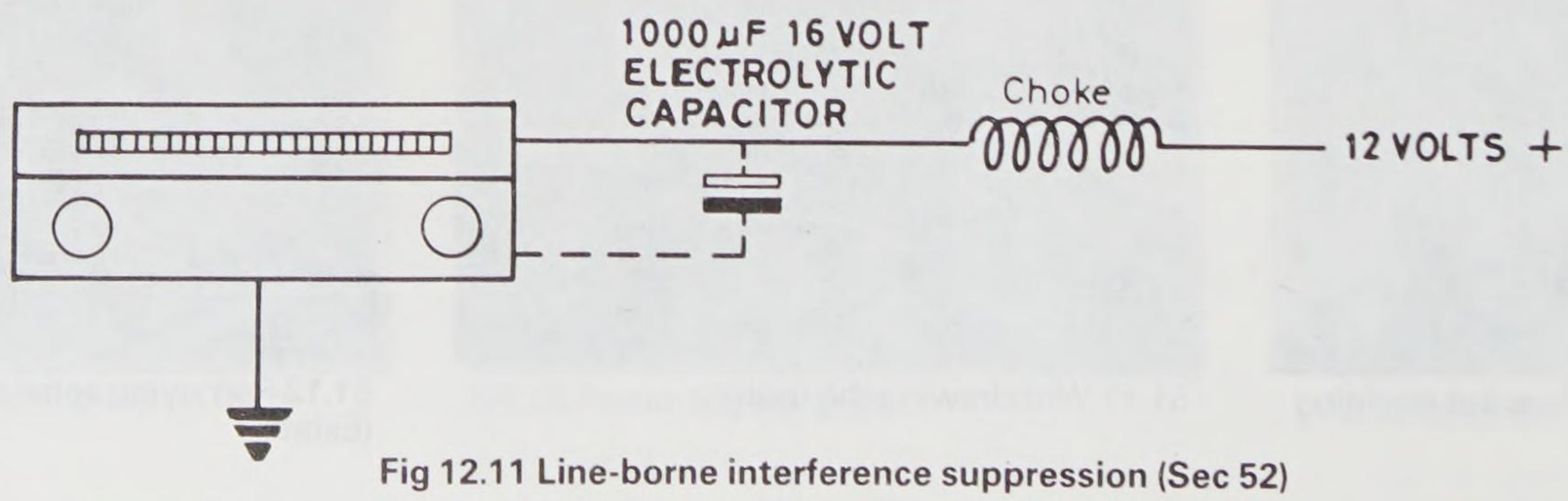


Fig 12.11 Line-borne interference suppression (Sec 52)

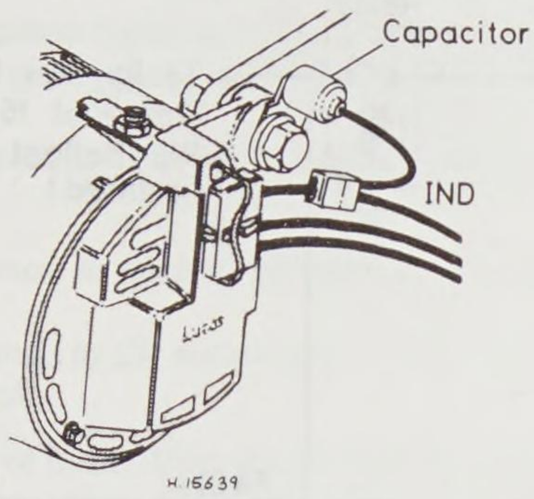


Fig 12.12 Suppression of interference from electronic voltage regulator when integral with alternator (Sec 52)

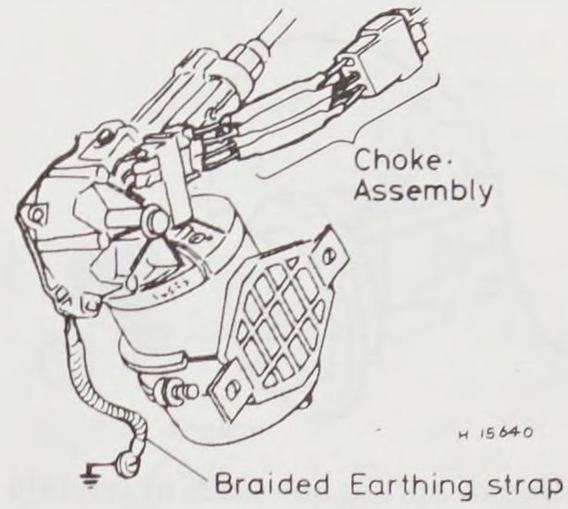


Fig 12.13 Wiper motor suppression (Sec 52)

A 1 microfarad capacitor connected from the LT supply side of the ignition coil to a good nearby earth point will complete basic ignition interference treatment. *NEVER fit a capacitor to the coil terminal to the contact breaker – the result would be burnt out points in a short time.*

If ignition noise persists despite the treatment above, the following sequence should be followed:

(a) Check the earthing of the ignition coil; remove paint from fixing clamp.

(b) If this does not work, lift the bonnet. Should there be no change in interference level, this may indicate that the bonnet is not electrically connected to the car body. Use a proprietary braided strap across a bonnet hinge ensuring a first class electrical connection. If, however, lifting the bonnet increases the interference, then fit resistive HT cables of a higher ohms-per-metre value.

(c) If all these measures fail, it is probable that re-radiation from metallic components is taking place. Using a braided strap between metallic points, go round the vehicle systematically – try the following: engine to body, exhaust system to body, front suspension to engine and to body, steering column to body (especially French and Italian cars), gear lever to engine and to body (again especially French and Italian cars), Bowden cable to body, metal parcel shelf to body. When an offending component is located it should be bonded with the strap permanently.

(d) As a next step, the fitting of distributor suppressors to each lead at the distributor end may help.

(e) Beyond this point is involved the possible screening of the distributor and fitting resistive spark plugs, but such advanced treatment is not usually required for vehicles with entertainment equipment.

Electronic ignition systems have built-in suppression components, but this does not relieve the need for using suppressed HT leads. In some cases it is permitted to connect a capacitor on the low tension supply side of the ignition coil, but not in every case. Makers' instructions should be followed carefully, otherwise damage to the ignition semiconductors may result.

Electronic voltage regulators are not always troublesome, but where necessary, a 1 microfarad capacitor from the regulator + terminal will help.

Integral electronic voltage regulators do not normally generate much interference, but when encountered this is in combination with alternator noise. A 1 microfarad or 2 microfarad capacitor from the warning lamp (IND) terminal to earth for Lucas ACR alternators and Femsa, Delco and Bosch equivalents should cure the problem.

Suppression methods – other equipment

Wiper motors – Connect the wiper body to earth with a bonding strap. For all motors use a 7 ampere choke assembly inserted in the leads to the motor.

Heater motors – Fit 7 ampere line chokes in both leads, assisted if necessary by a 1 microfarad capacitor to earth from both leads.

Electronic tachometer – The tachometer is a possible source of ignition noise – check by disconnecting at the ignition coil CB terminal. It usually feeds from ignition coil LT pulses at the contact breaker terminal. A 3 ampere line choke should be fitted in the tachometer lead at the coil CB terminal.

Horn – A capacitor and choke combination is effective if the horn is directly connected to the 12 volt supply. The use of a relay is an alternative remedy, as this will reduce the length of the interference-carrying leads.

Electrostatic noise – Characteristics are erratic crackling at the receiver, with disappearance of symptoms in wet weather. Often shocks may be given when touching bodywork. Part of the problem is the build-up of static electricity in non-driven wheels and the acquisition of charge on the body shell. It is possible to fit spring-loaded contacts at the wheels to give good conduction between the rotary wheel parts and the vehicle frame. Changing a tyre sometimes helps – because of tyres' varying resistances. In difficult cases a trailing flex which touches the ground will cure the problem. If this is not acceptable it is worth trying conductive paint on the tyre walls.

Fuel pump – Suppression requires a 1 microfarad capacitor between the supply wire to the pump and a nearby earth point. If this is insufficient a 7 ampere line choke connected in the supply wire near the pump is required.

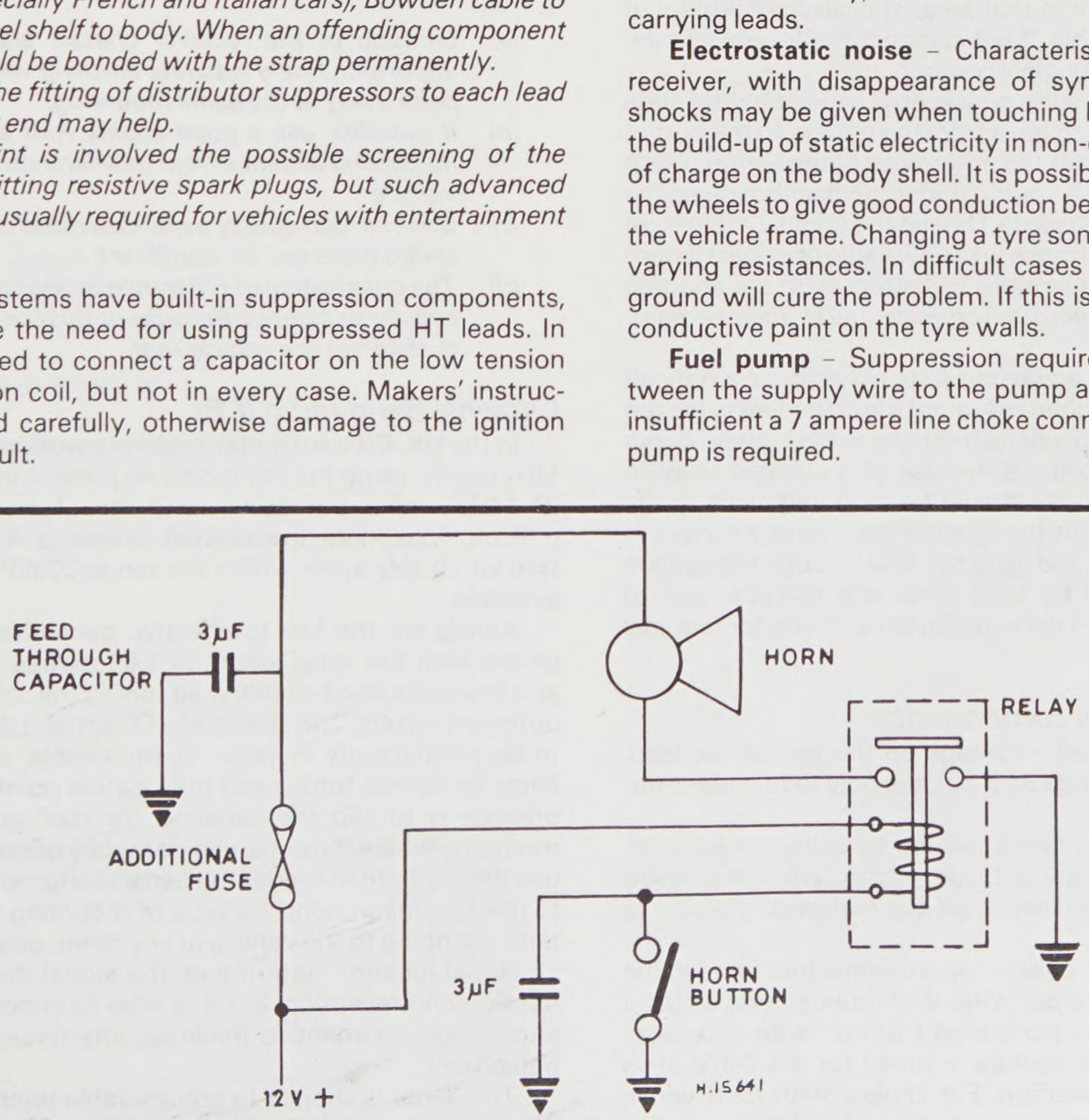


Fig 12.14 Use of a relay to reduce horn interference (Sec 52)

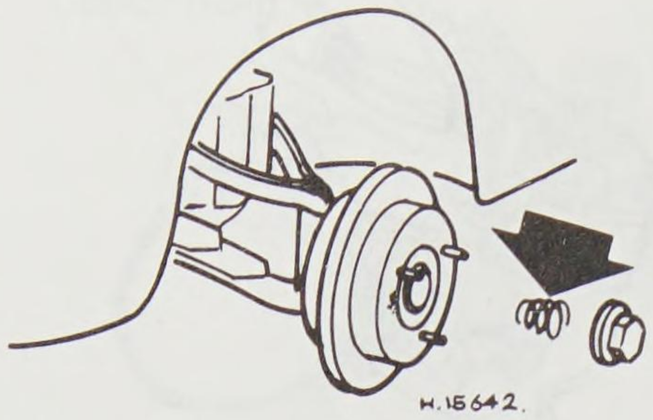


Fig 12.15 Use of spring contacts at wheels (Sec 52)

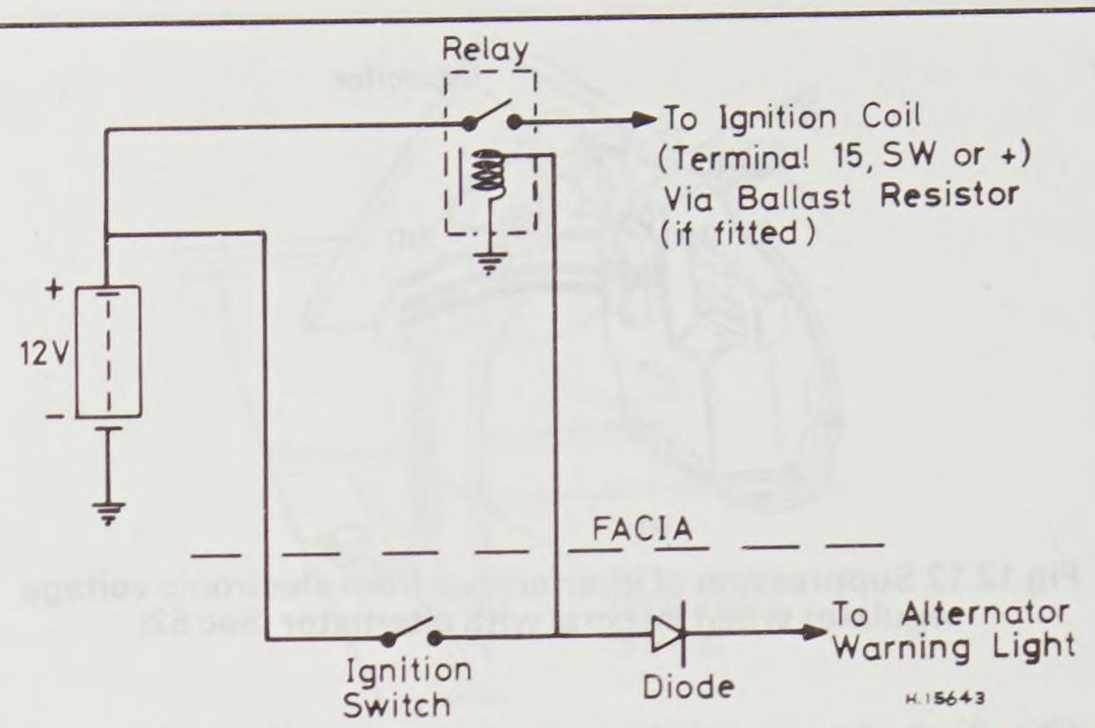


Fig 12.16 Use of ignition coil relay to suppress case breakthrough (Sec 52)

Fluorescent tubes – Vehicles used for camping/caravanning frequently have fluorescent tube lighting. These tubes require a relatively high voltage for operation and this is provided by an inverter (a form of oscillator) which steps up the vehicle supply voltage. This can give rise to serious interference to radio reception, and the tubes themselves can contribute to this interference by the pulsating nature of the lamp discharge. In such situations it is important to mount the aerial as far away from a fluorescent tube as possible. The interference problem may be alleviated by screening the tube with fine wire turns spaced an inch (25 mm) apart and earthed to the chassis. Suitable chokes should be fitted in both supply wires close to the inverter.

Radio/cassette case breakthrough

Magnetic radiation from dashboard wiring may be sufficiently intense to break through the metal case of the radio/cassette player. Often this is due to a particular cable routed too close and shows up as ignition interference on AM and cassette play and/or alternator whine on cassette play.

The first point to check is that the clips and/or screws are fixing all parts of the radio/cassette case together properly. Assuming good earthing of the case, see if it is possible to re-route the offending cable – the chances of this are not good, however, in most cars.

Next release the radio/cassette player and locate it in different positions with temporary leads. If a point of low interference is found, then if possible fix the equipment in that area. This also confirms that local radiation is causing the trouble. If re-location is not feasible, fit the radio/cassette player back in the original position.

Alternator interference on cassette play is now caused by radiation from the main charging cable which goes from the battery to the output terminal of the alternator, usually via the + terminal of the starter motor relay. In some vehicles this cable is routed under the dashboard, so the solution is to provide a direct cable route. Detach the original cable from the alternator output terminal and make up a new cable of at least 6 mm^2 cross-sectional area to go from alternator to battery with the shortest possible route. *Remember – do not run the engine with the alternator disconnected from the battery.*

Ignition breakthrough on AM and/or cassette play can be a difficult problem. It is worth wrapping earthed foil round the offending cable run near the equipment, or making up a deflector plate well screwed down to a good earth. Another possibility is the use of a suitable relay to switch on the ignition coil. The relay should be mounted close to the ignition coil; with this arrangement the ignition coil primary current is not taken into the dashboard area and does not flow through the ignition switch. A suitable diode should be used since it is possible that at ignition switch-off the output from the warning lamp alternator terminal could hold the relay on.

Connectors for suppression components

Capacitors are usually supplied with tags on the end of the lead, while the capacitor body has a flange with a slot or hole to fit under a nut or screw with washer.

Connections to feed wires are best achieved by self-stripping connectors. These connectors employ a blade which, when squeezed down by pliers, cuts through cable insulation and makes connection to the copper conductors beneath.

Chokes sometimes come with bullet snap-in connectors fitted to the wires, and also with just bare copper wire. With connectors, suitable female cable connectors may be purchased from an auto-accessory shop together with any extra connectors required for the cable ends after being cut for the choke insertion. For chokes with bare wires, similar connectors may be employed together with insulation sleeving as required.

VHF/FM broadcasts

Reception of VHF/FM in an automobile is more prone to problems than the medium and long wavebands. Medium/long wave transmitters are capable of covering considerable distances, but VHF transmitters are restricted to line of sight, meaning ranges of 10 to 50 miles, depending upon the terrain, the effects of buildings and the transmitter power.

Because of the limited range it is necessary to retune on a long journey, and it may be better for those habitually travelling long distances or living in areas of poor provision of transmitters to use an AM radio working on medium/long wavebands.

When conditions are poor, interference can arise, and some of the suppression devices described previously fall off in performance at very high frequencies unless specifically designed for the VHF band. Available suppression devices include reactive HT cable, resistive distributor caps, screened plug caps, screened leads and resistive spark plugs.

For VHF/FM receiver installation the following points should be particularly noted:

(a) Earthing of the receiver chassis and the aerial mounting is important. Use a separate earthing wire at the radio, and scrape paint away at the aerial mounting.

(b) If possible, use a good quality roof aerial to obtain maximum height and distance from interference generating devices on the vehicle.

(c) Use of a high quality aerial downlead is important, since losses in cheap cable can be significant.

(d) The polarisation of FM transmissions may be horizontal, vertical, circular or slanted. Because of this the optimum mounting angle is at 45° to the vehicle roof.

Citizens' Band radio (CB)

In the UK, CB transmitter/receivers work within the 27 MHz and 934 MHz bands, using the FM mode. At present interest is concentrated on 27 MHz where the design and manufacture of equipment is less difficult. Maximum transmitted power is 4 watts, and 40 channels spaced 10 kHz apart within the range 27.60125 to 27.99125 MHz are available.

Aerials are the key to effective transmission and reception. Regulations limit the aerial length to 1.65 metres including the loading coil and any associated circuitry, so tuning the aerial is necessary to obtain optimum results. The choice of a CB aerial is dependent on whether it is to be permanently installed or removable, and the performance will hinge on correct tuning and the location point on the vehicle. Common practice is to clip the aerial to the roof gutter or to employ wing mounting where the aerial can be rapidly unscrewed. An alternative is to use the boot rim to render the aerial theftproof, but a popular solution is to use the 'magmount' – a type of mounting having a strong magnetic base clamping to the vehicle at any point, usually the roof.

Aerial location determines the signal distribution for both transmission and reception, but it is wise to choose a point away from the engine compartment to minimise interference from vehicle electrical equipment.

The aerial is subject to considerable wind and acceleration forces. Cheaper units will whip backwards and forwards and in so doing will alter the relationship with the metal surface of the vehicle with which it

forms a ground plane aerial system. The radiation pattern will change correspondingly, giving rise to break-up of both incoming and outgoing signals.

Interference problems on the vehicle carrying CB equipment fall into two categories:

(a) *Interference to nearby TV and radio receivers when transmitting.*
(b) *Interference to CB set reception due to electrical equipment on the vehicle.*

Problems of break-through to TV and radio are not frequent, but can be difficult to solve. Mostly trouble is not detected or reported because the vehicle is moving and the symptoms rapidly disappear at the TV/radio receiver, but when the CB set is used as a base station any trouble with nearby receivers will soon result in a complaint.

It must not be assumed by the CB operator that his equipment is faultless, for much depends upon the design. Harmonics (that is, multiples) of 27 MHz may be transmitted unknowingly and these can fall into other user's bands. Where trouble of this nature occurs, low pass filters in the aerial or supply leads can help, and should be fitted in base station aerials as a matter of course. In stubborn cases it may be necessary to call for assistance from the licensing authority, or, if possible, to have the equipment checked by the manufacturers.

Interference received on the CB set from the vehicle equipment is, fortunately, not usually a severe problem. The precautions outlined previously for radio/cassette units apply, but there are some extra points worth noting.

It is common practice to use a slide-mount on CB equipment enabling the set to be easily removed for use as a base station, for example. Care must be taken that the slide mount fittings are properly earthed and that first class connection occurs between the set and slide-mount.

Vehicle manufacturers in the UK are required to provide suppression of electrical equipment to cover 40 to 250 MHz to protect TV and VHF radio bands. Such suppression appears to be adequately effective at 27 MHz, but suppression of individual items such as alternators/dynamos, clocks, stabilisers, flashers, wiper motors, etc, may still be necessary. The suppression capacitors and chokes available from auto-electrical suppliers for entertainment receivers will usually give the required results with CB equipment.

Other vehicle radio transmitters

Besides CB radio already mentioned, a considerable increase in the use of transceivers (ie combined transmitter and receiver units) has taken place in the last decade. Previously this type of equipment was fitted mainly to military, fire, ambulance and police vehicles, but a large business radio and radio telephone usage has developed.

Generally the suppression techniques described previously will suffice, with only a few difficult cases arising. Suppression is carried out to satisfy the 'receive mode', but care must be taken to use heavy duty chokes in the equipment supply cables since the loading on 'transmit' is relatively high.

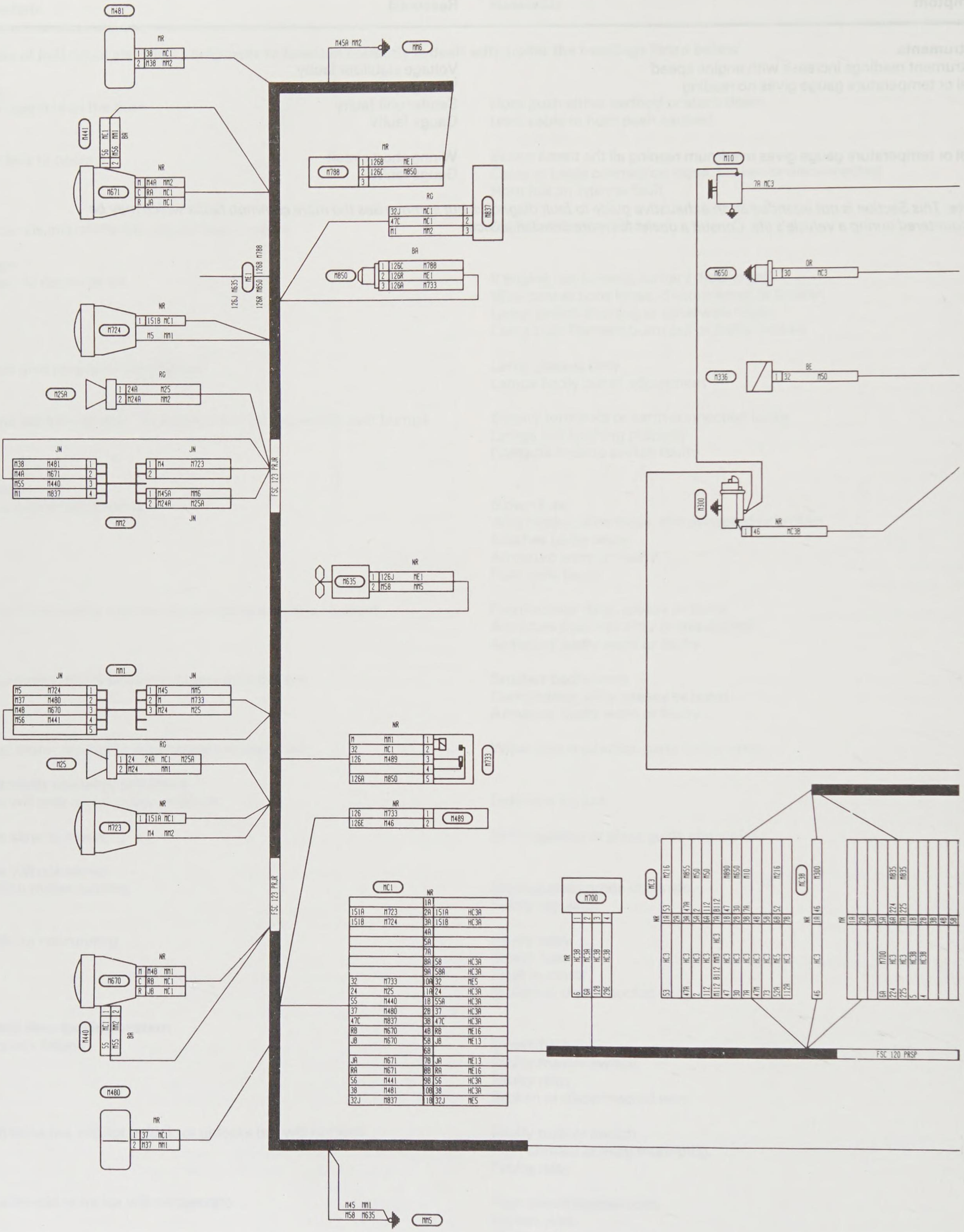
53 Fault diagnosis – electrical system

Symptom	Reason(s)
Starter fails to turn engine	Battery discharged Battery defective internally Leads loose, or terminals corroded Loose connections at starter motor Engine earth strap loose, broken or missing Starter motor faulty or solenoid not functioning Starter motor brushes worn Commutator dirty or worn Starter motor armature faulty Field coils earthed
Starter turns engine very slowly	Battery in discharged condition Starter brushes badly worn, sticking or brush wires loose Loose wires in starter motor circuit
Starter spins but does not turn engine	Pinion or flywheel gear teeth broken or worn
Starter motor noisy or excessively rough engagement	Pinion or flywheel gear teeth broken or worn Starter motor retaining bolts loose
Battery will not hold charge for more than a few days	Battery defective, internally Electrolyte level too low or electrolyte too weak due to leakage Plate separators no longer fully effective Battery plates severely sulphated Alternator drivebelt slipping Battery terminal connections loose or corroded Alternator not charging Short-circuit causing continual battery drain Voltage regulator unit not working correctly
Ignition light fails to go out, battery runs flat in a few days	Alternator drivebelt loose and slipping or broken Alternator brushes worn, sticking, broken or dirty Alternator brush springs weak or broken Internal fault in alternator

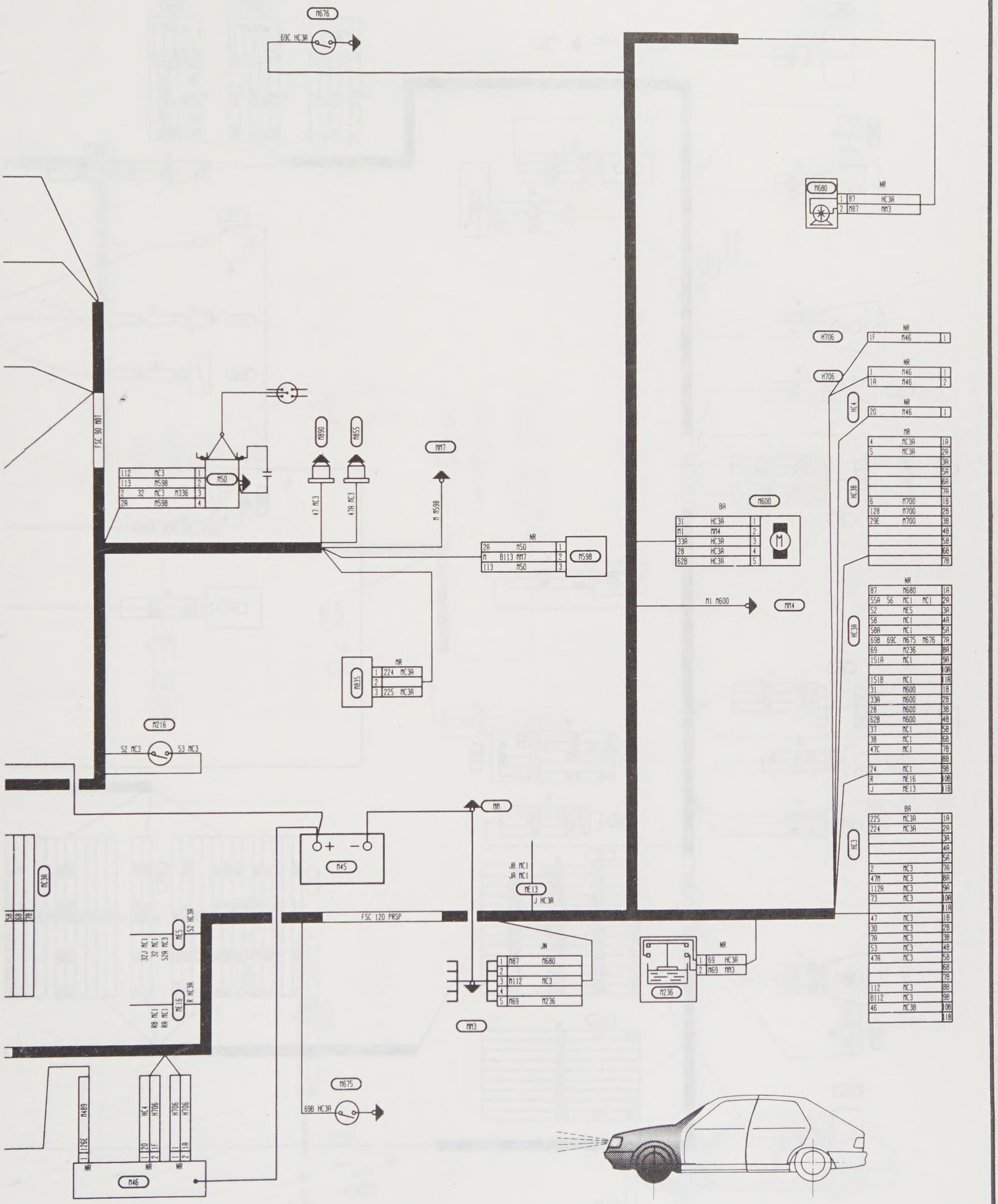
Symptom	Reason(s)
Failure of individual electrical equipment to function correctly is dealt with under the headings listed below	
Horn	
Horn operates all the time	Horn push either earthed or stuck down Horn cable to horn push earthed
Horn fails to operate	Blown fuse Cable or cable connection loose, broken or disconnected Horn has an internal fault
Horn emits intermittent or unsatisfactory noise	Cable connections loose
Lamps	
Lamps do not come on	If engine not running, battery discharged Wire connections loose, disconnected or broken Lamp switch shorting or otherwise faulty Lamp bulb filament burnt out or bulbs broken
Lamps give very poor illumination	Lamp glasses dirty Lamps badly out of adjustment
Lamps work erratically – flashing on and off, especially over bumps	Battery terminals or earth connection loose Lamps not earthing properly Contacts in lamp switch faulty
Wipers	
Wiper motor fails to work	Blown fuse Wire connections loose, disconnected or broken Brushes badly worn Armature worn or faulty Field coils faulty
Wiper motor works very slowly and takes excessive current	Commutator dirty, greasy or burnt Armature bearings dirty or misaligned Armature badly worn or faulty
Wiper motor works slowly and takes little current	Brushes badly worn Commutator dirty, greasy or burnt Armature badly worn or faulty
Wiper motor works but wiper blades remain static	Wiper motor gearbox parts badly worn
Electrically operated windows	
Glass will only move in one direction	Defective switch
Glass slow to move	Stiff regulator or glass guide channels
Glass will not move:	
With motor running	Binding glass guide channels Faulty regulator
Motor not running	Faulty relay Blown fuse Fault in motor Broken or disconnected wire
Central door locking system	
Complete failure	Blown fuse Faulty master switch Faulty relay Broken or disconnected wire
Latch locks but will not unlock, or unlocks but will not lock	Faulty master switch Poor contact in relay multi-plug Faulty relay
One solenoid or motor will not operate	Poor circuit connections Broken wire Faulty solenoid or motor Binding bellcrank rod Binding driver's door lock button (or passenger door lock button on models from 1987) Fault in lock

Symptom	Reason(s)
Instruments	
Instrument readings increase with engine speed	Voltage stabilizer faulty
Fuel or temperature gauge gives no reading	Wiring open circuit Sender unit faulty Gauge faulty
Fuel or temperature gauge gives maximum reading all the time	Wiring short circuit Gauge faulty

Note: *This Section is not intended as an exhaustive guide to fault diagnosis, but summarises the more common faults which may be encountered during a vehicle's life. Consult a dealer for more detailed advice.*



12.17 Engine compartment wiring diagram – carburettor models up to January 1990



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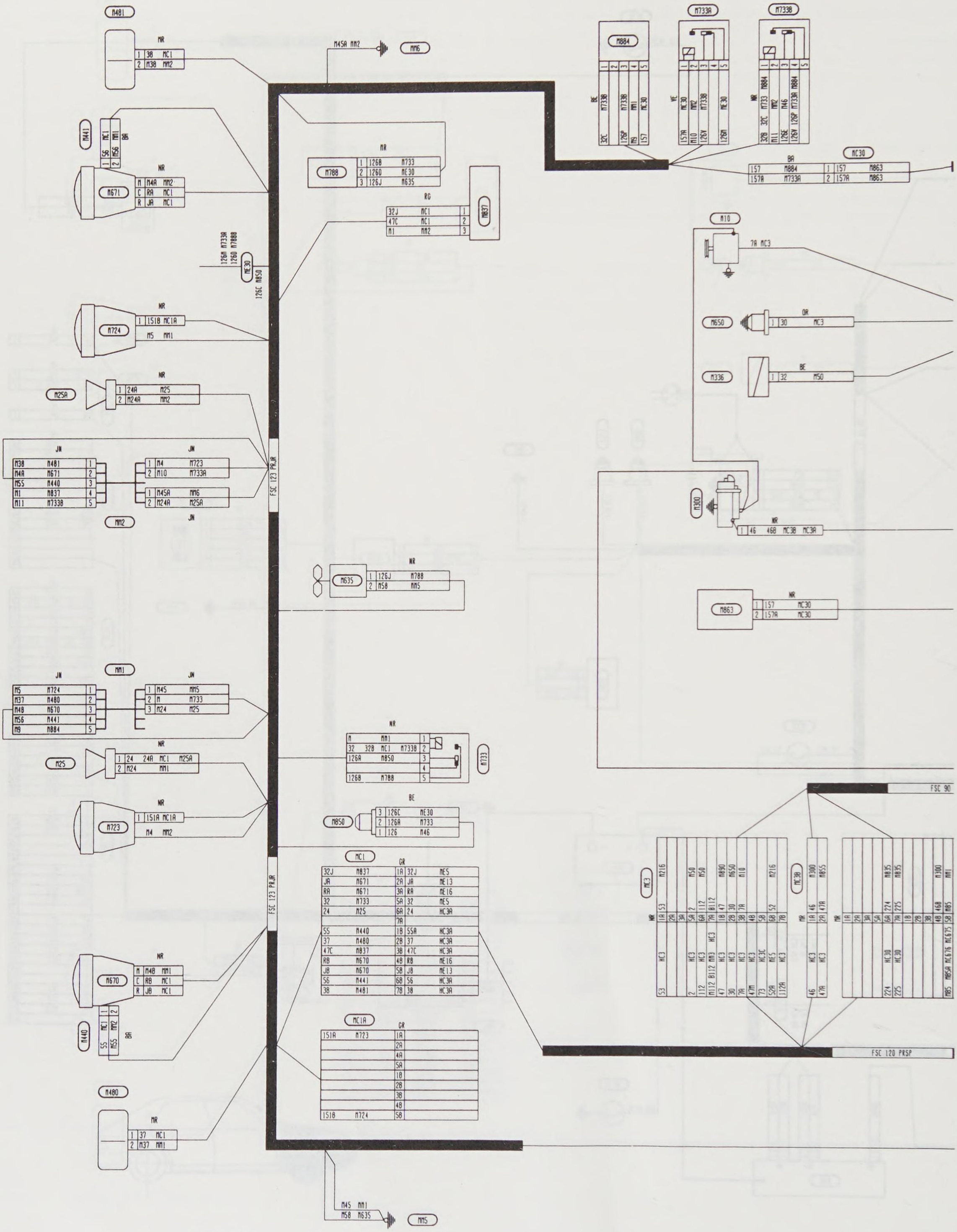
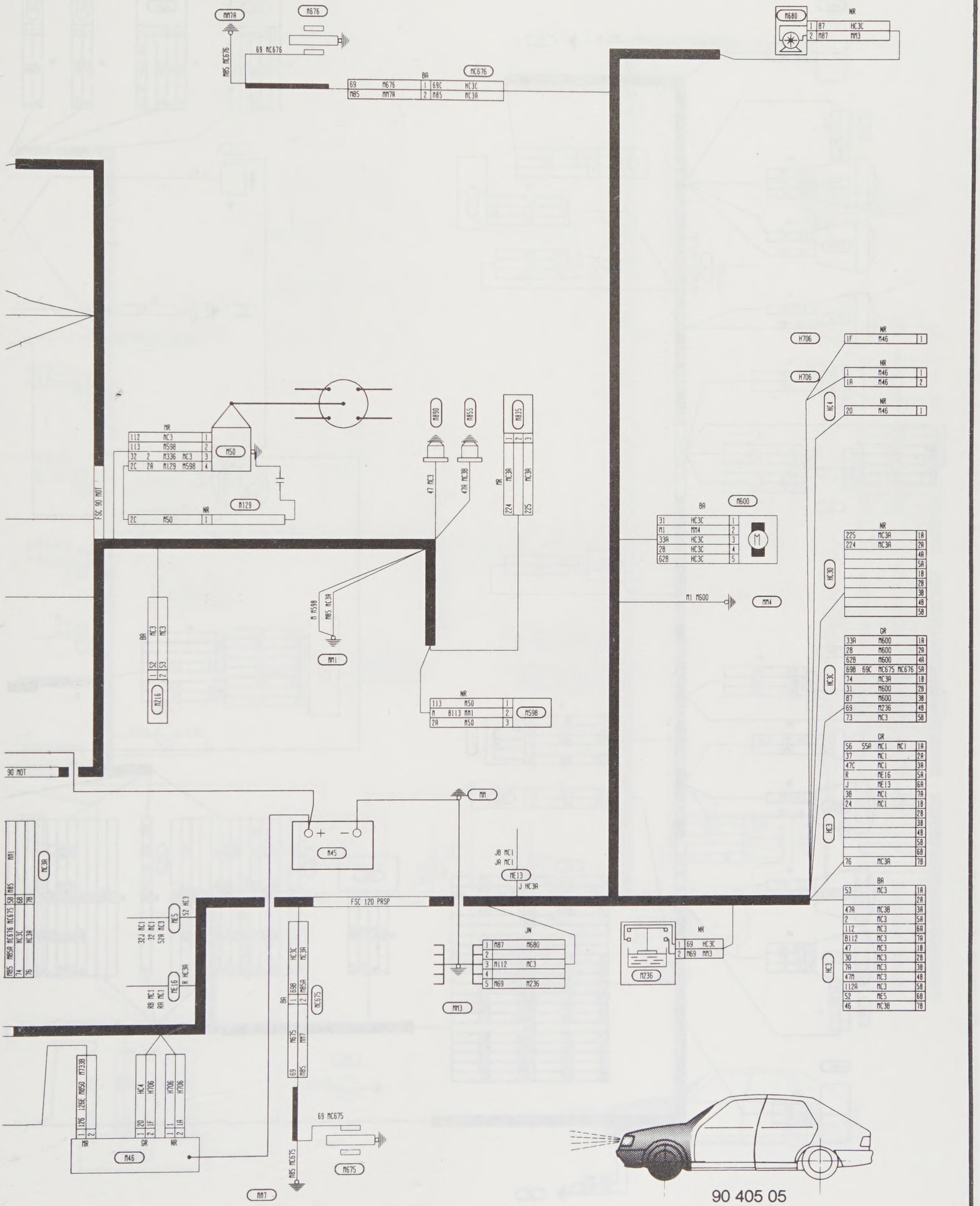
12.17 Engine compartment wiring diagram – carburettor models up to January 1990 (continued)

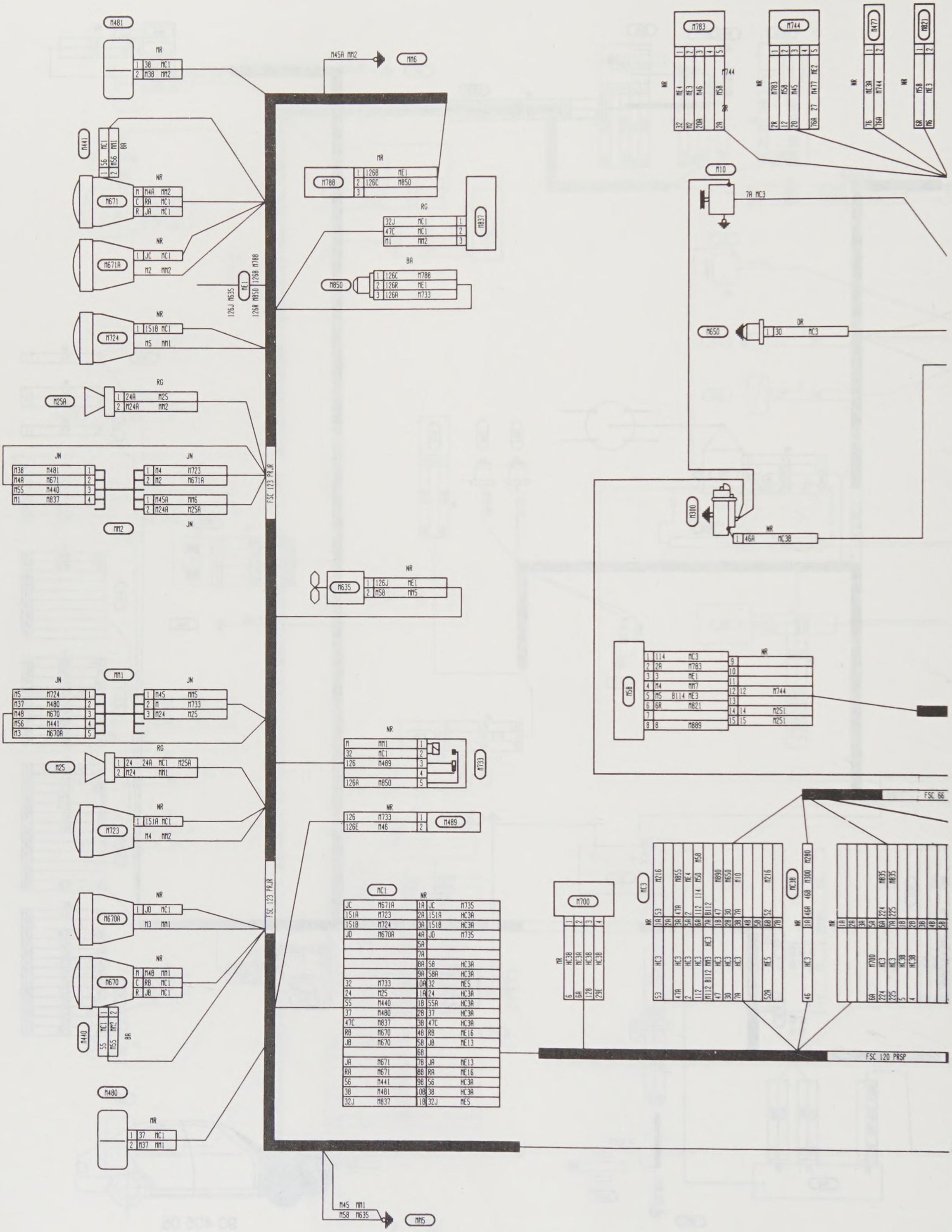


12.18 Engine compartment wiring diagram – carburettor models from January 1990

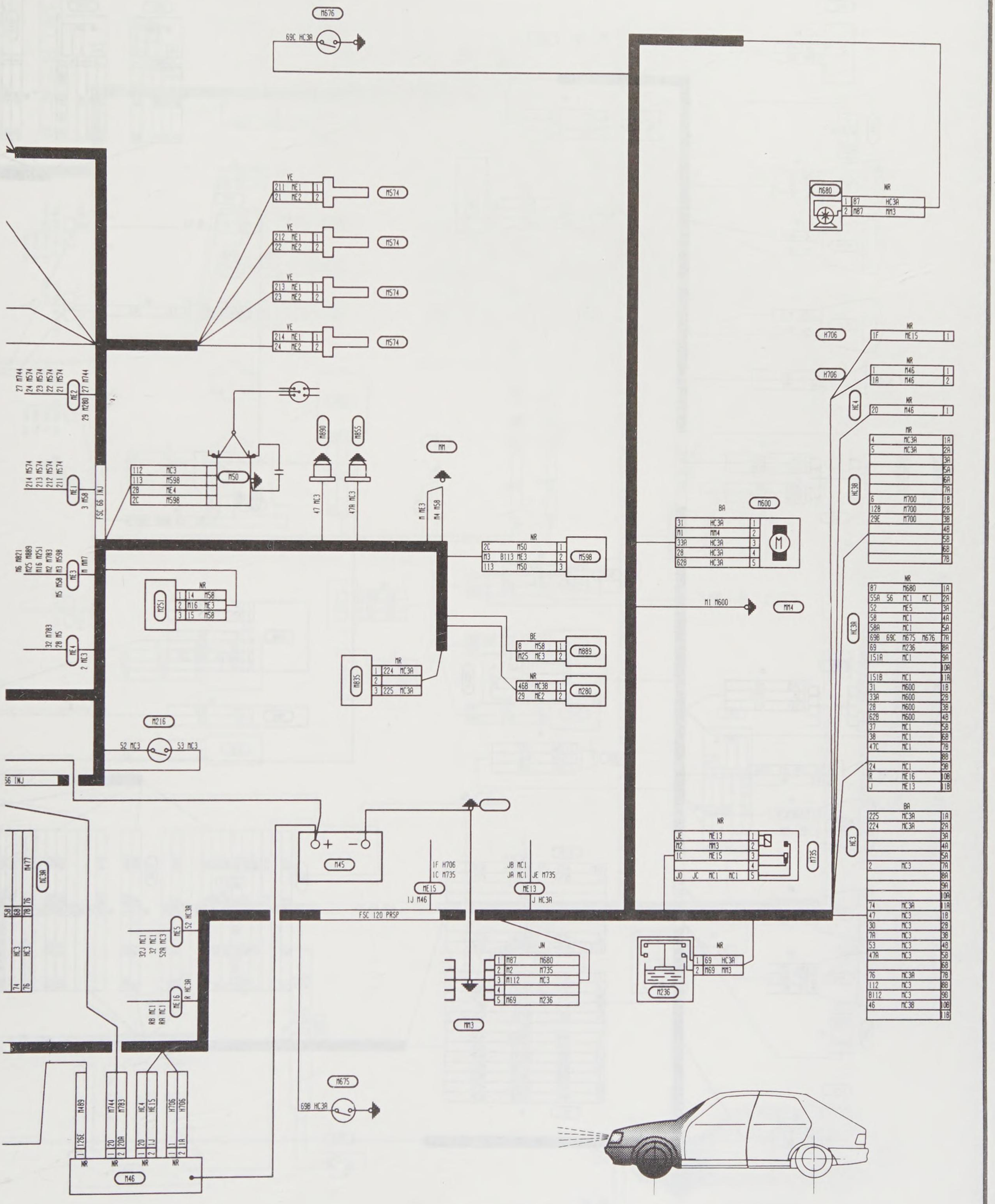


90 405 05

12.18 Engine compartment wiring diagram – carburettor models from January 1990 (continued)

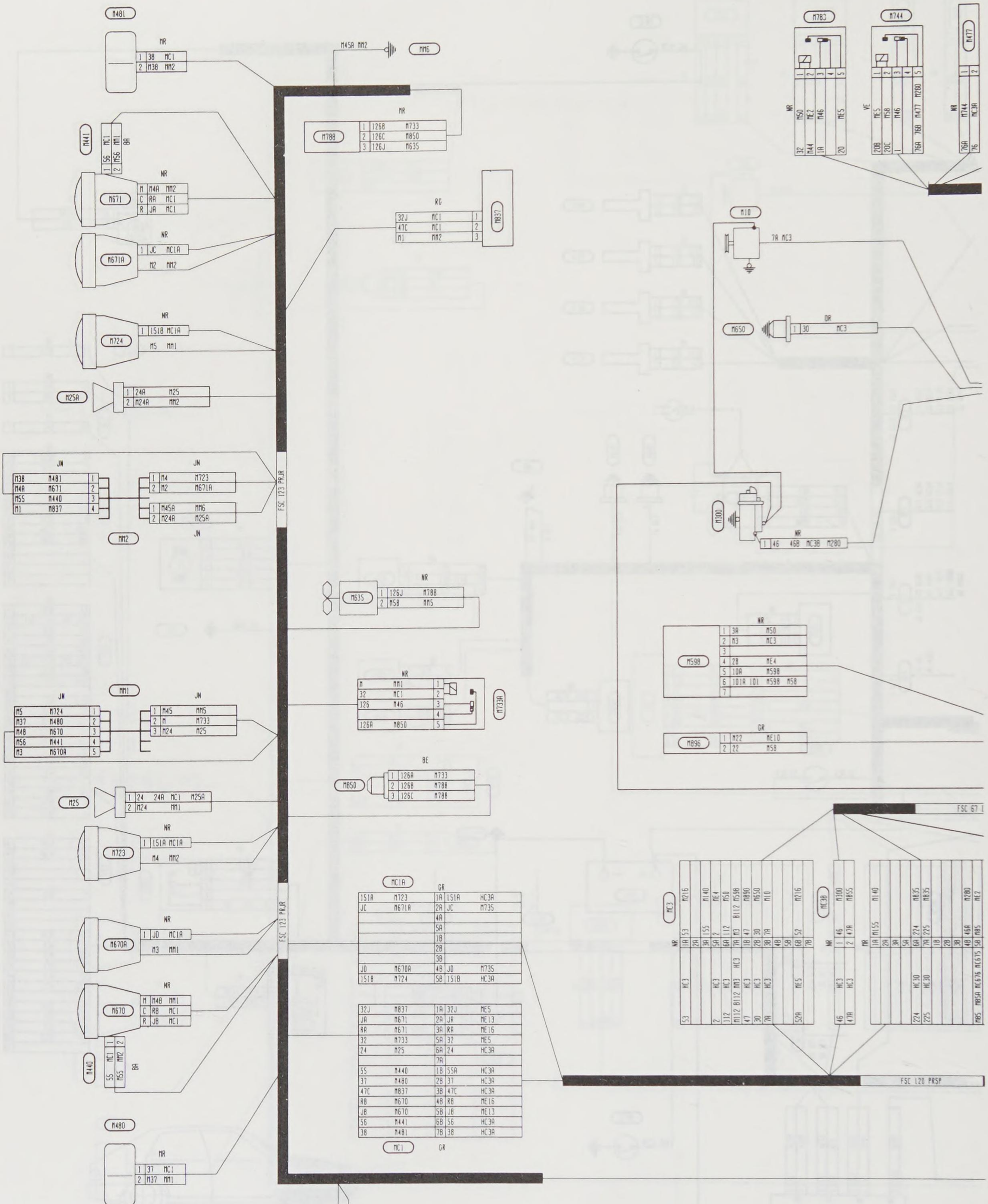


12.19 Engine compartment wiring diagram – L3.1 Jetronic fuel injection models up to December 1989

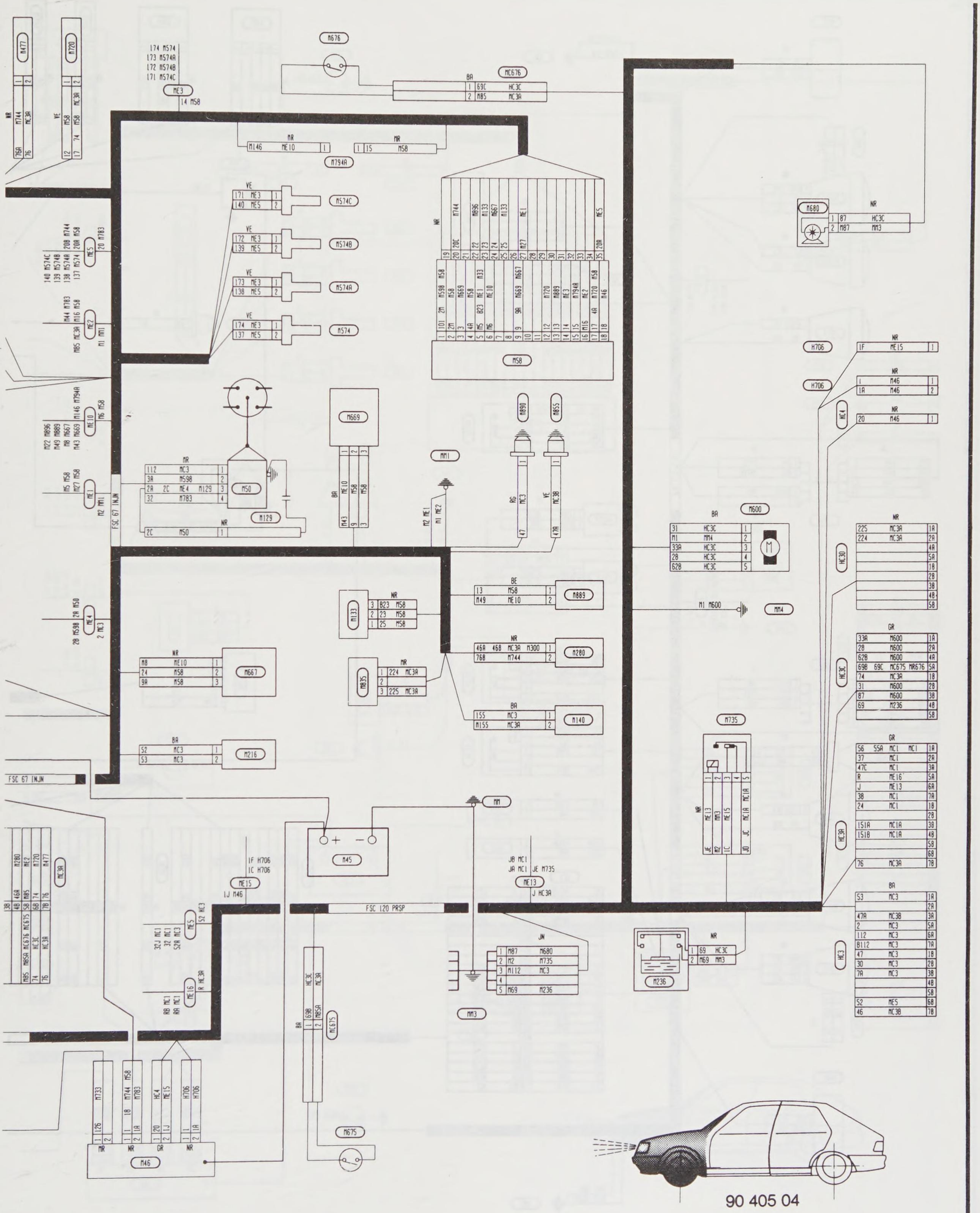


88 405 03

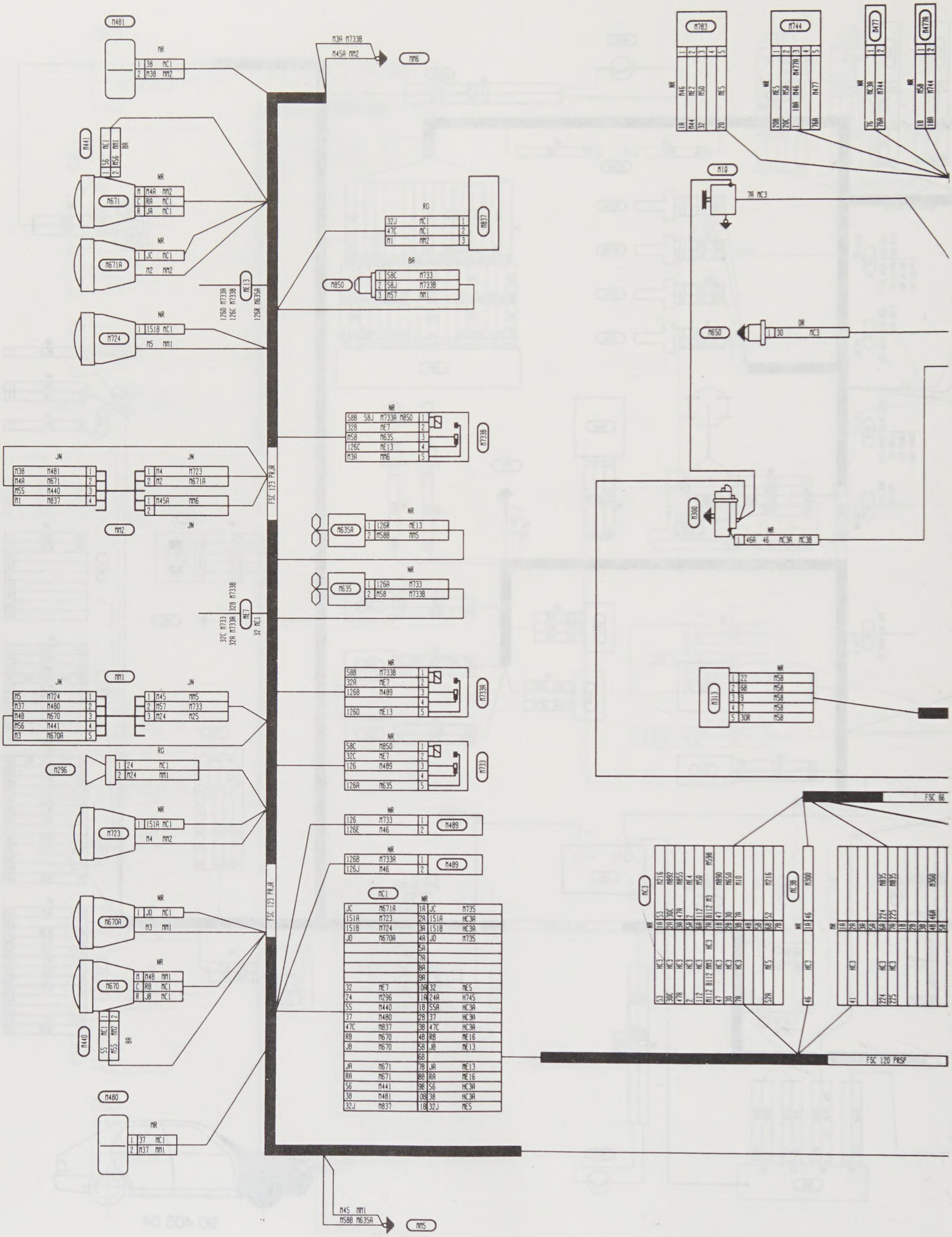
12.19 Engine compartment wiring diagram – L3.1 Jetronic fuel injection models up to December 1989 (continued)



12.20 Engine compartment wiring diagram – L3.1 Jetronic fuel injection models from December 1989



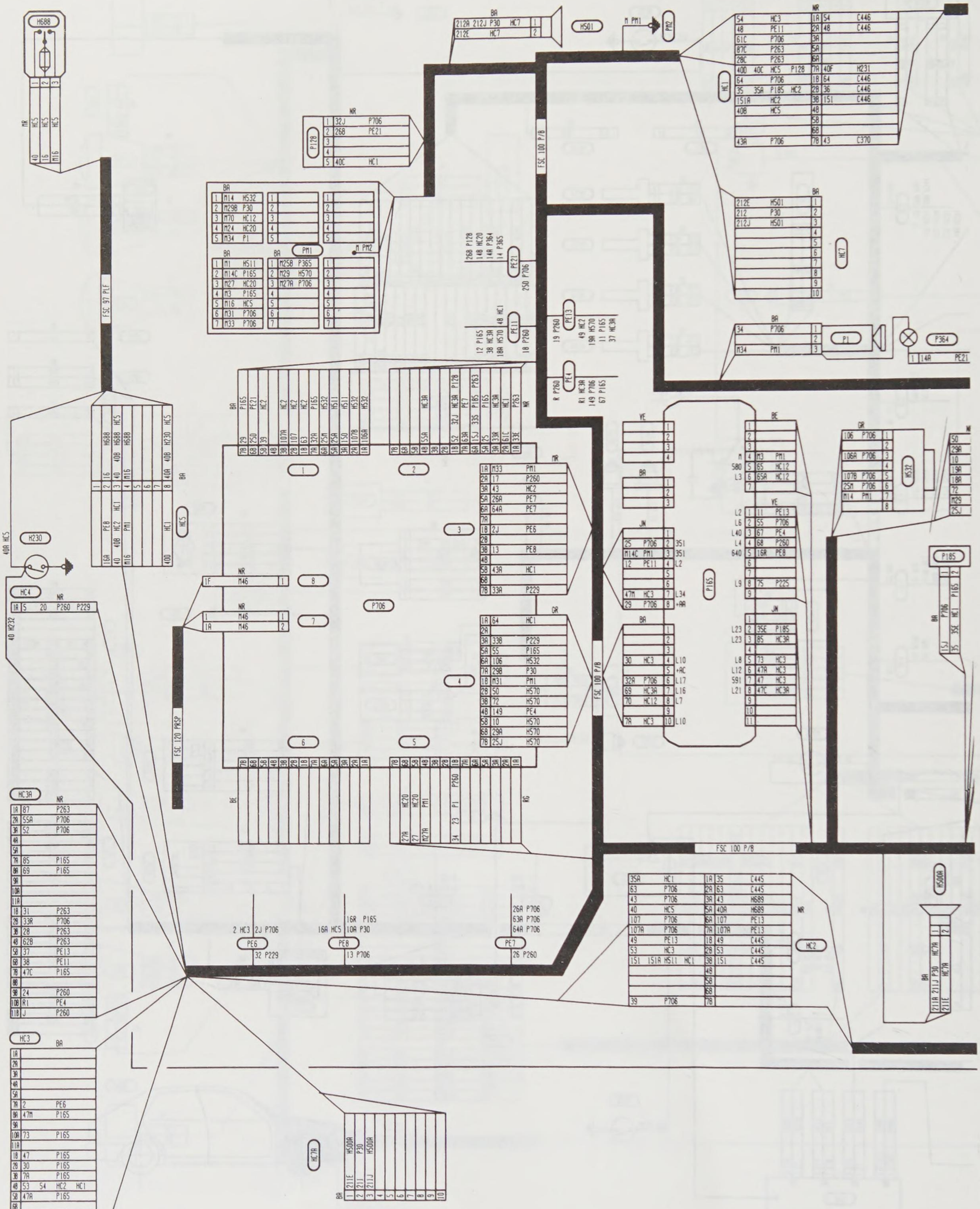
12.20 Engine compartment wiring diagram – L3.1 Jetronic fuel injection models from December 1989 (continued)



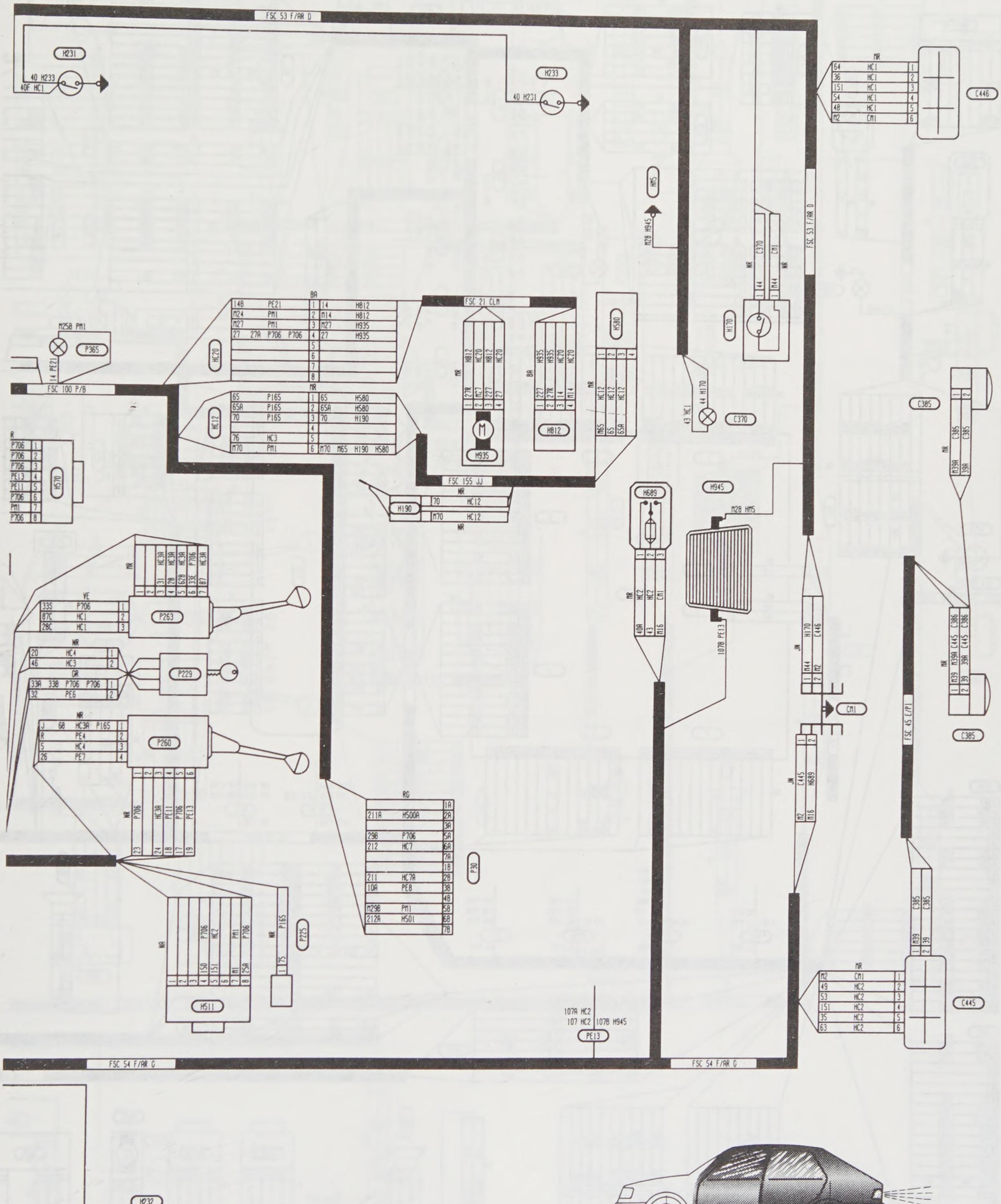
12.21 Engine compartment wiring diagram – Mi 16 models

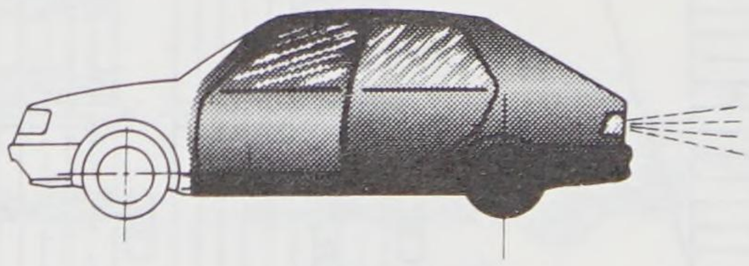
88 405 04

12.21 Engine compartment wiring diagram – Mi 16 models (continued)



12.22 Passenger compartment wiring diagram – models with low specification trim





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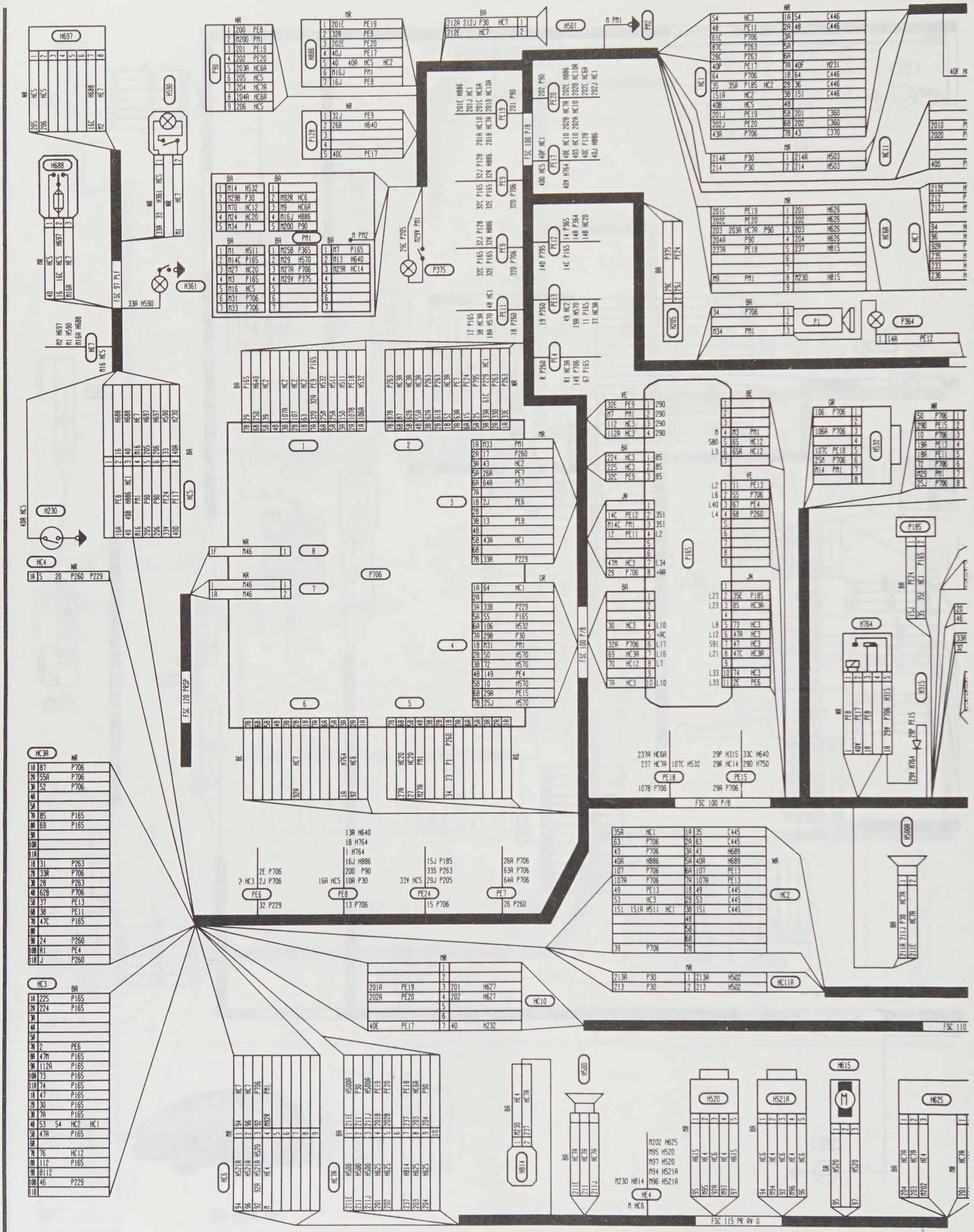
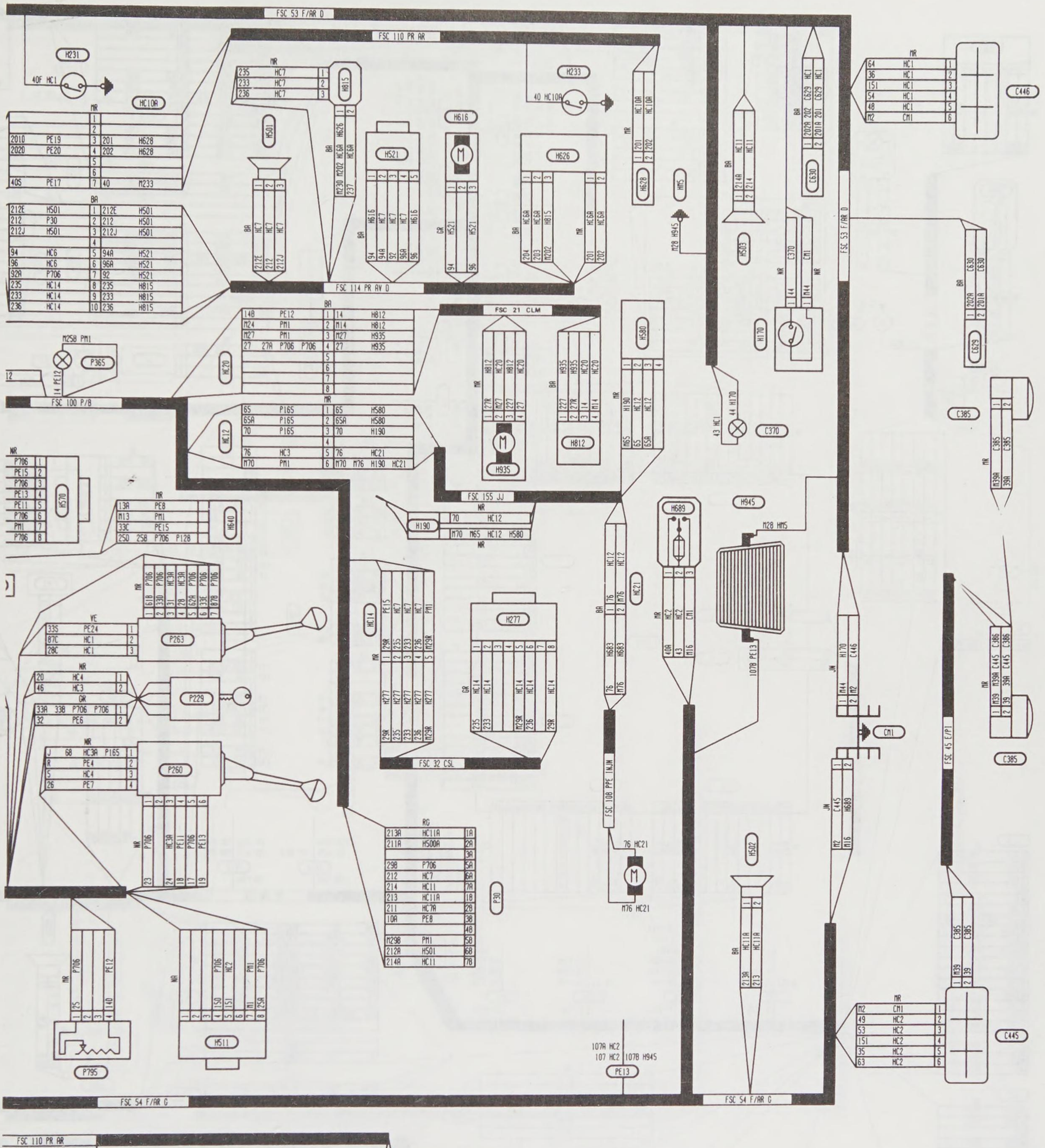
12.22 Passenger compartment wiring diagram – models with low specification trim (continued)



12.23 Passenger compartment wiring diagram – models with medium specification trim



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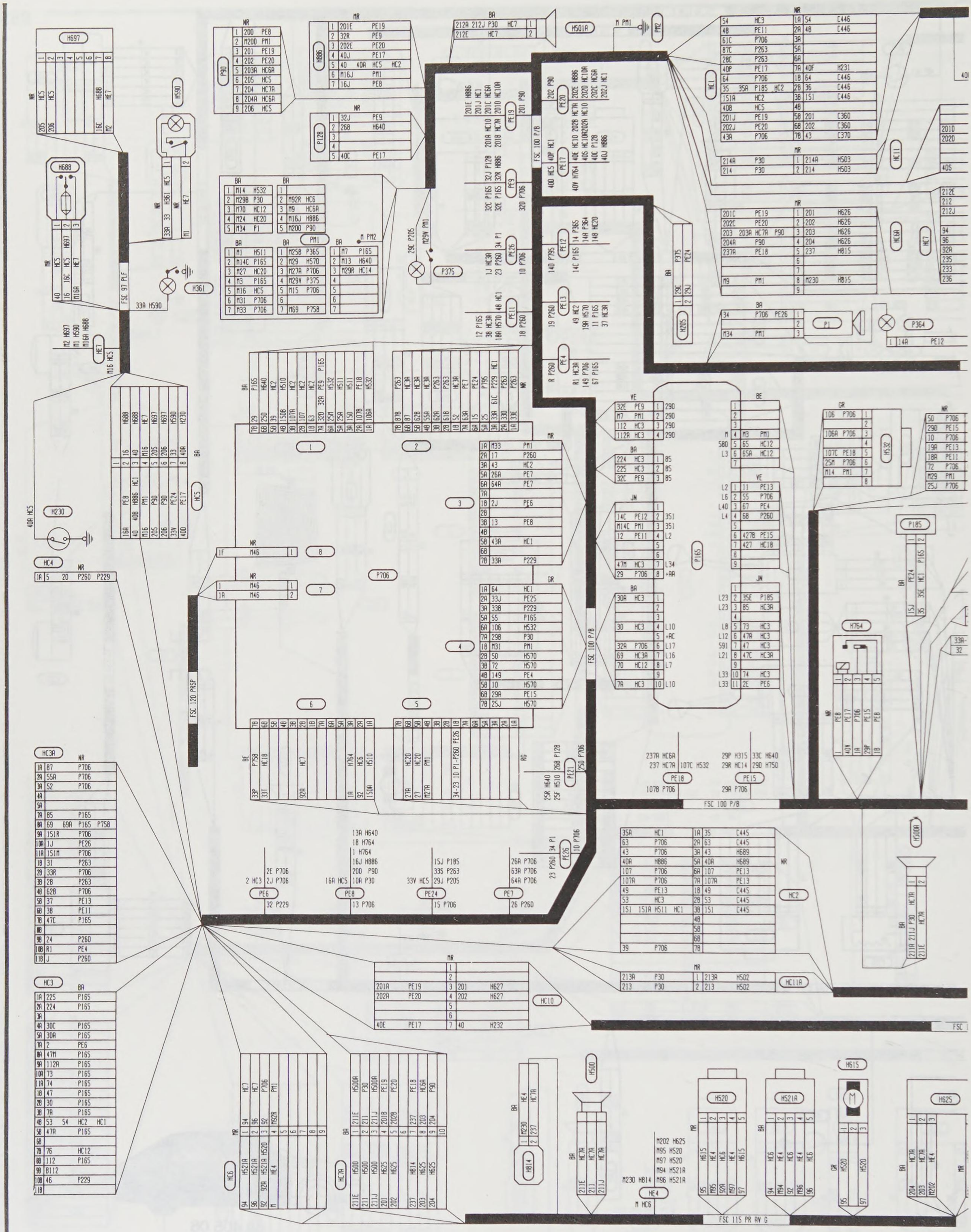
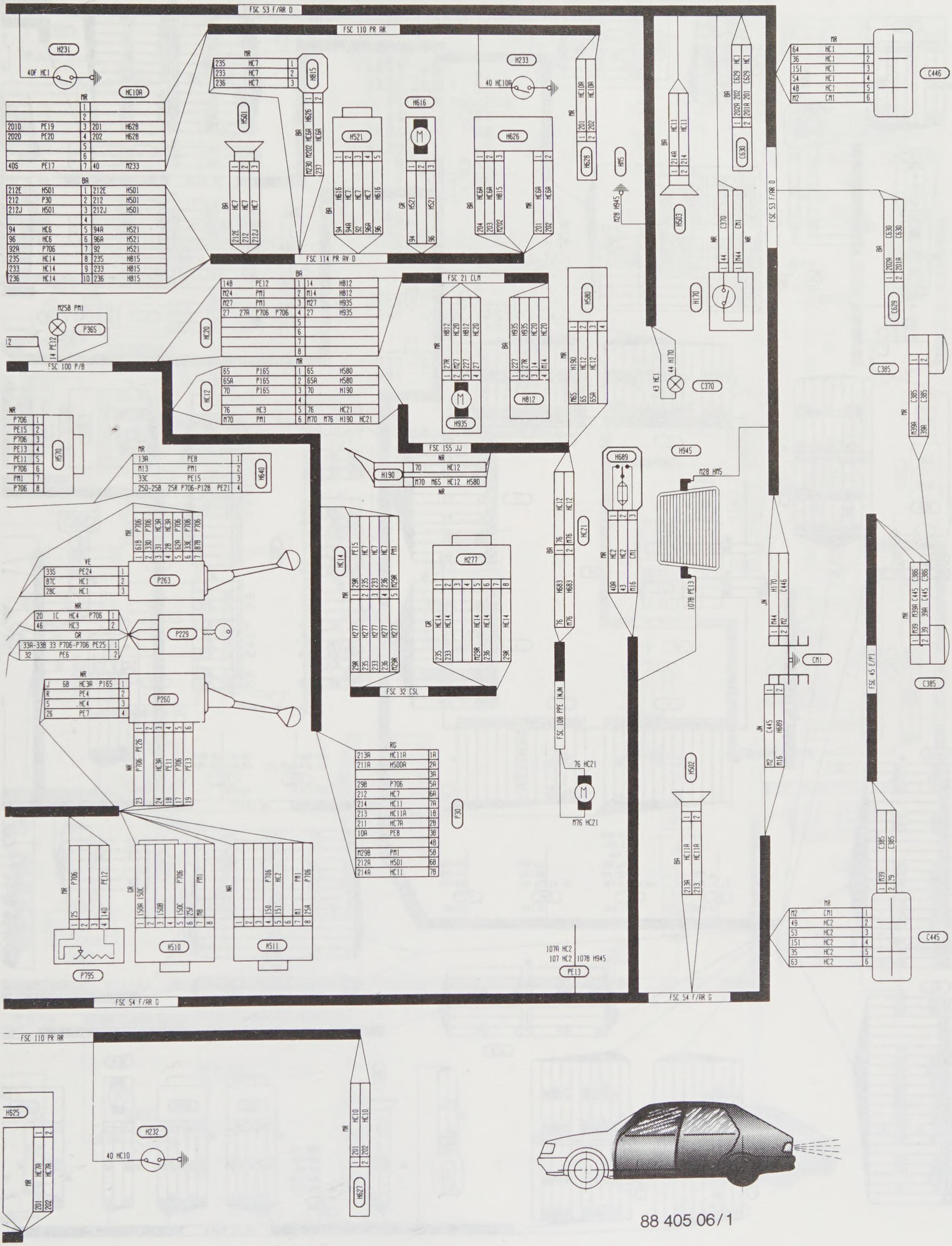
12.23 Passenger compartment wiring diagram – models with medium specification trim (continued)



12.24 Passenger compartment wiring diagram – models with high specification trim



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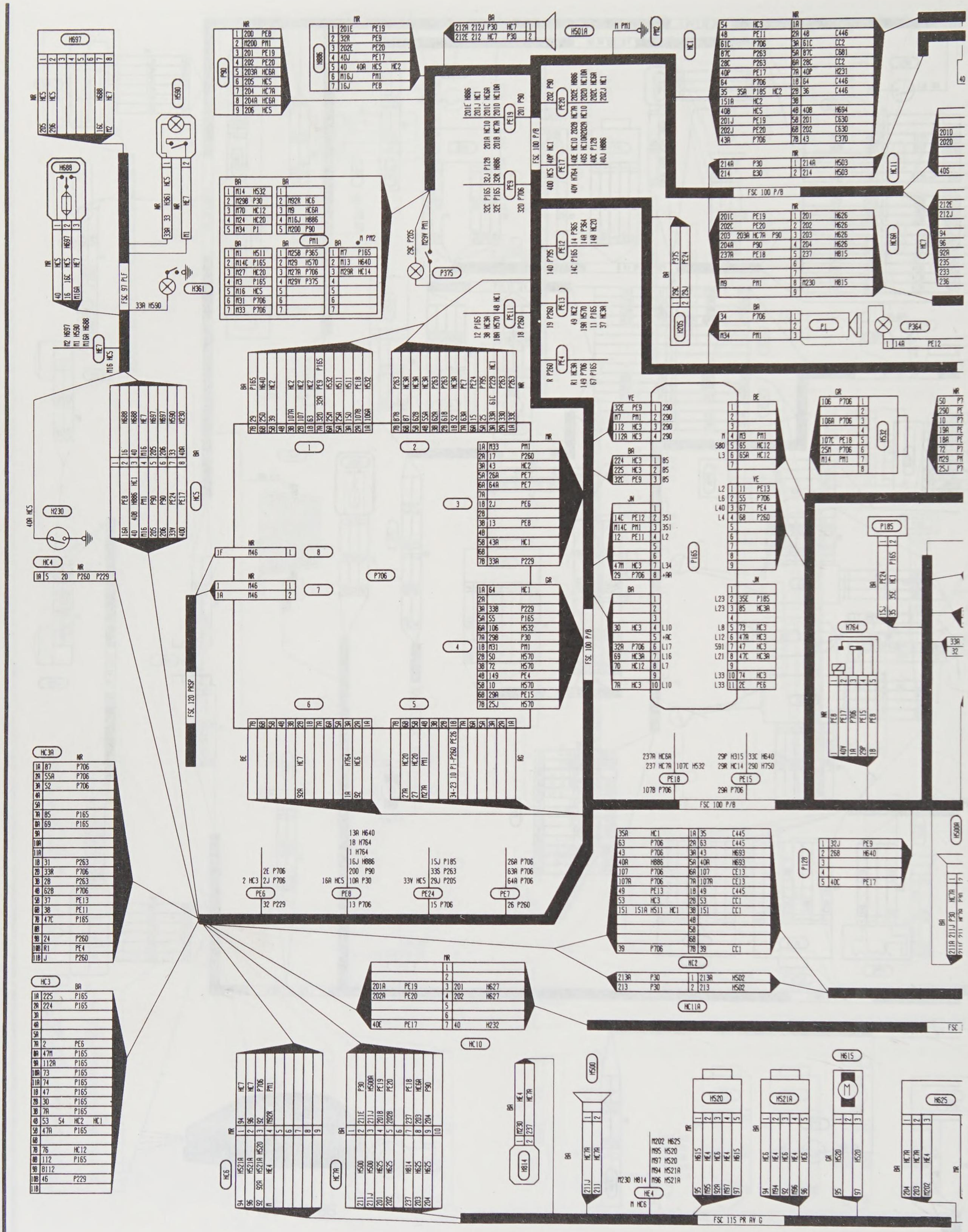
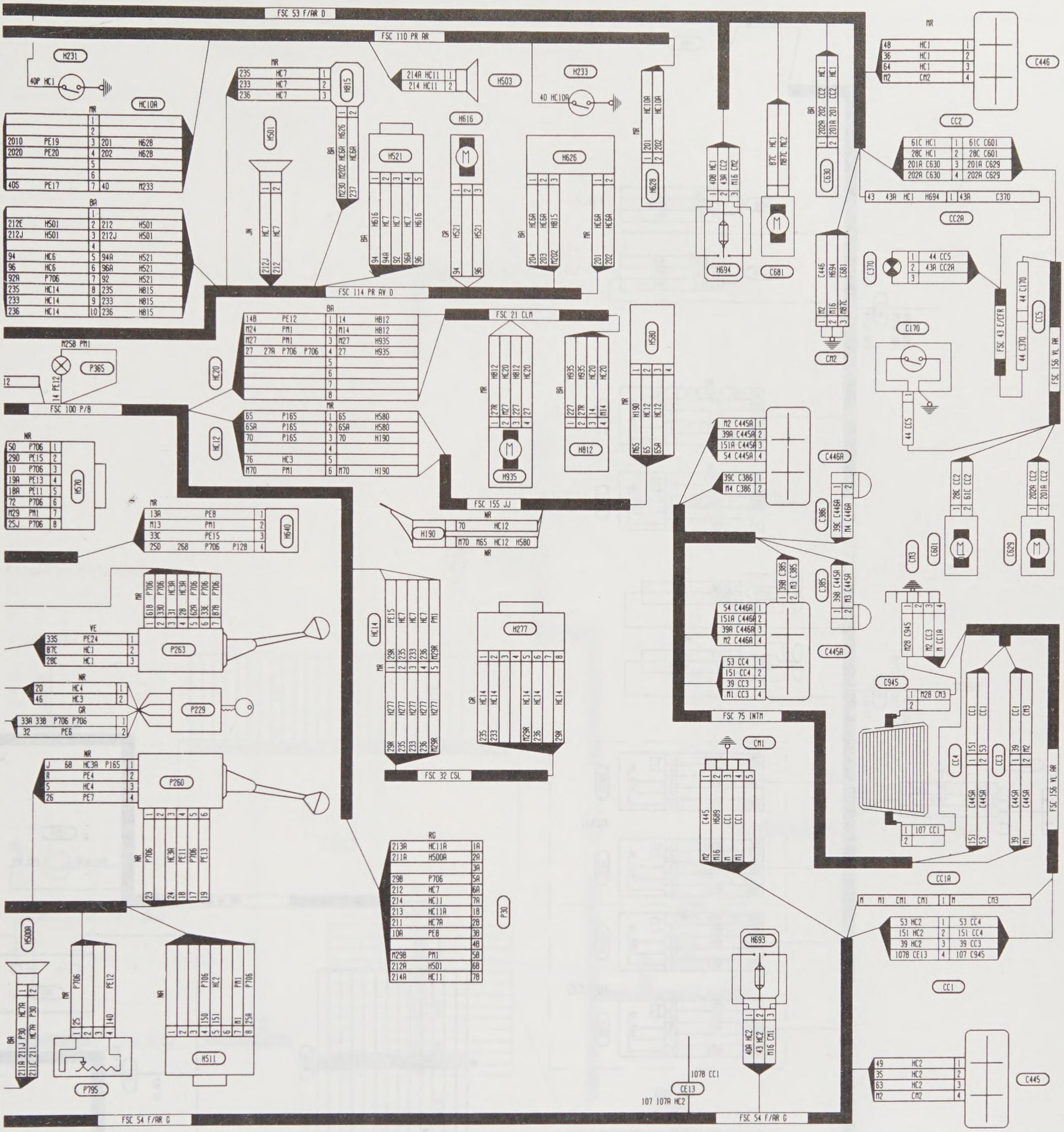
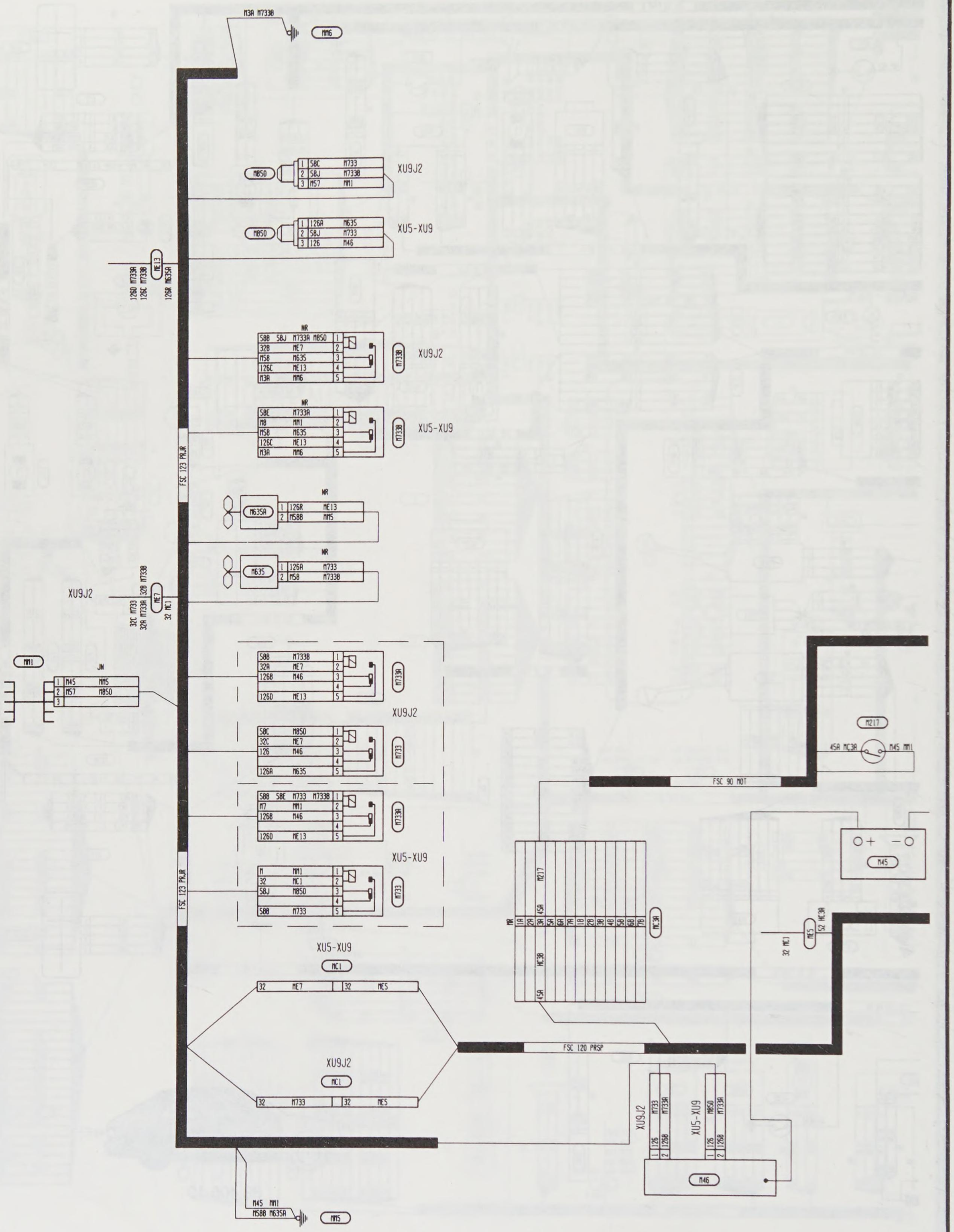
12.24 Passenger compartment wiring diagram – models with high specification trim (continued)



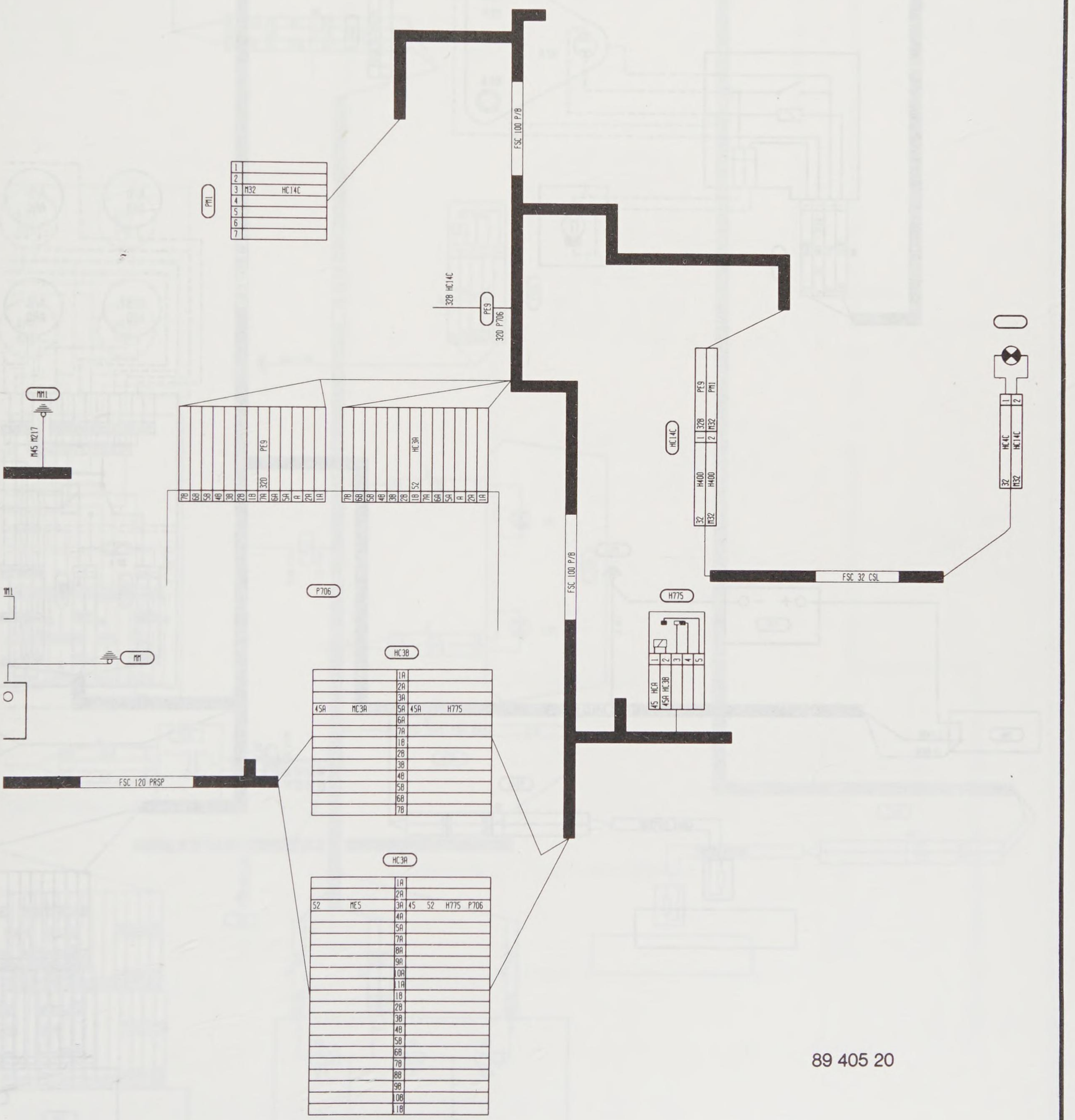
12.25 Passenger compartment wiring diagram – Estate models



12.25 Passenger compartment wiring diagram – Estate models (continued)



12.26 Wiring diagram for automatic transmission



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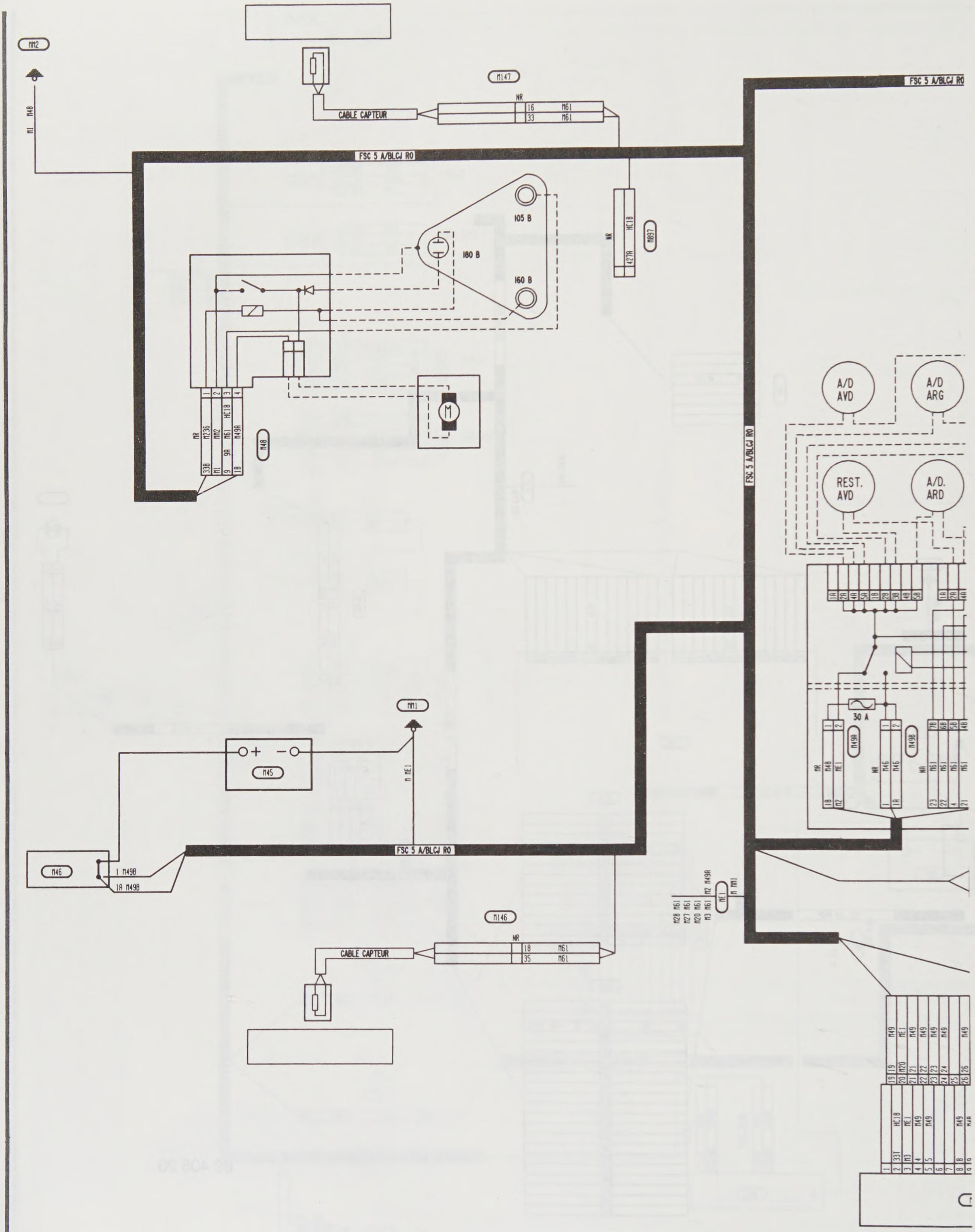
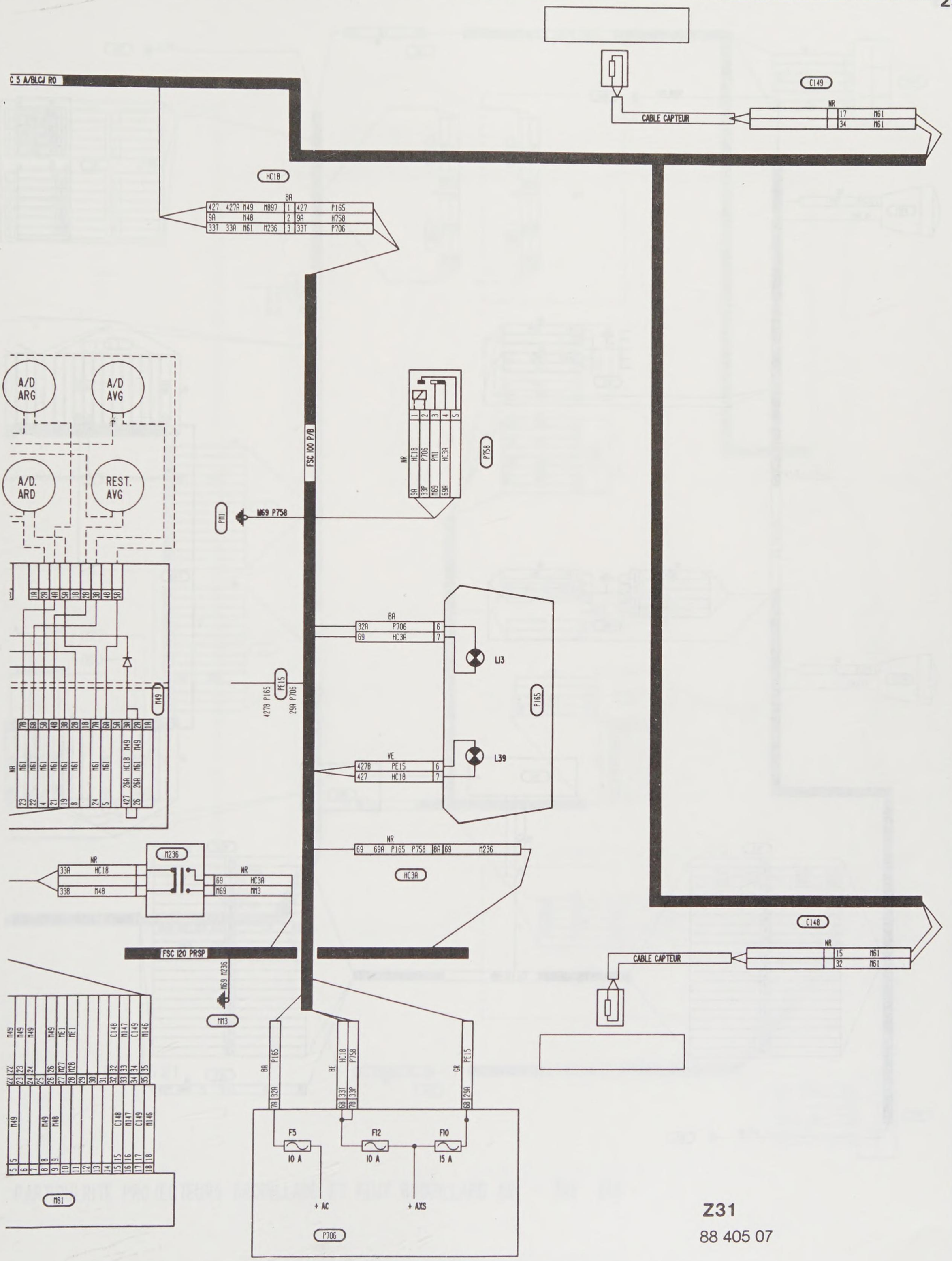
12.26 Wiring diagram for automatic transmission (continued)



12.27 Wiring diagram for sunroof and electric windows



Z31

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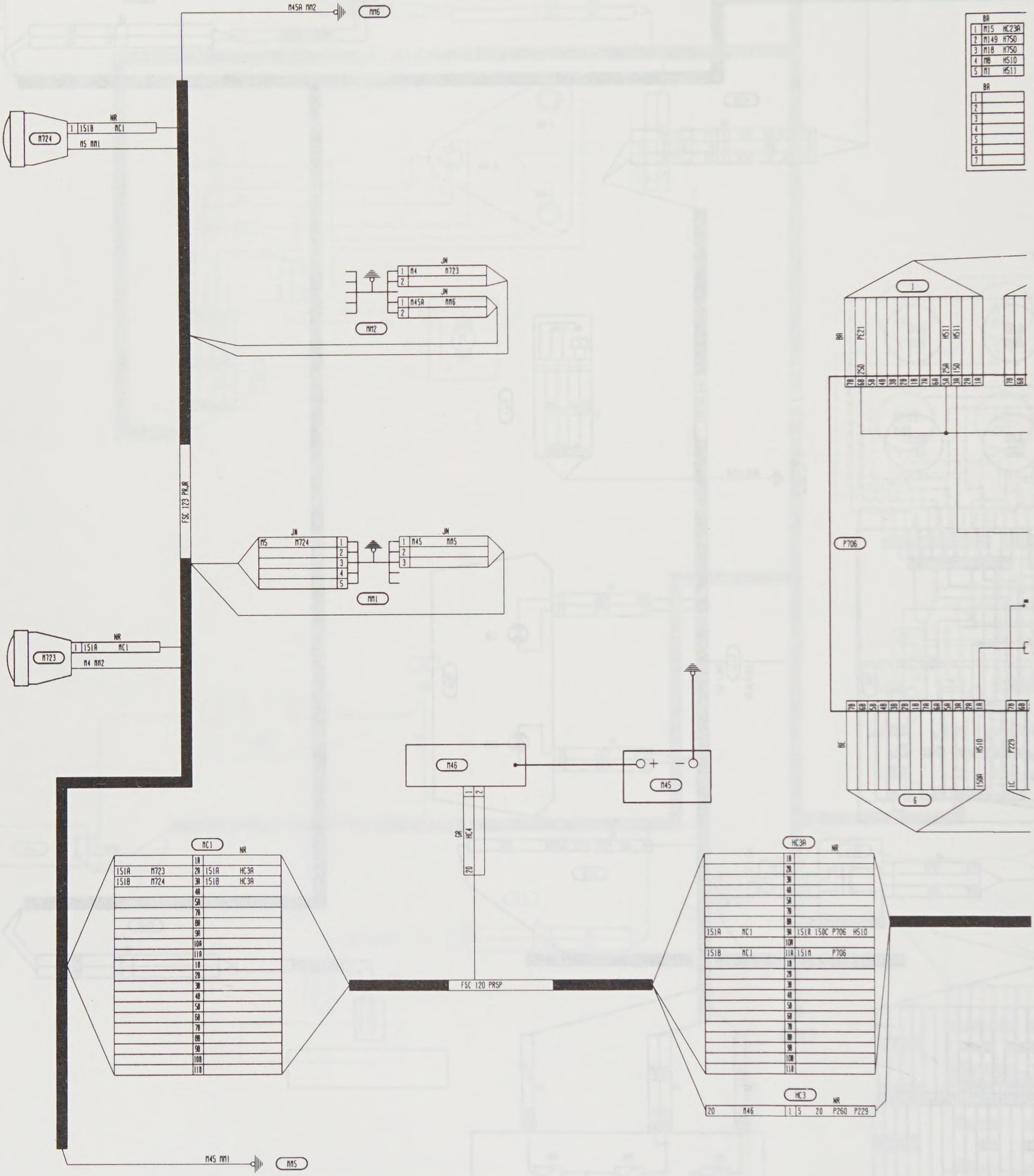
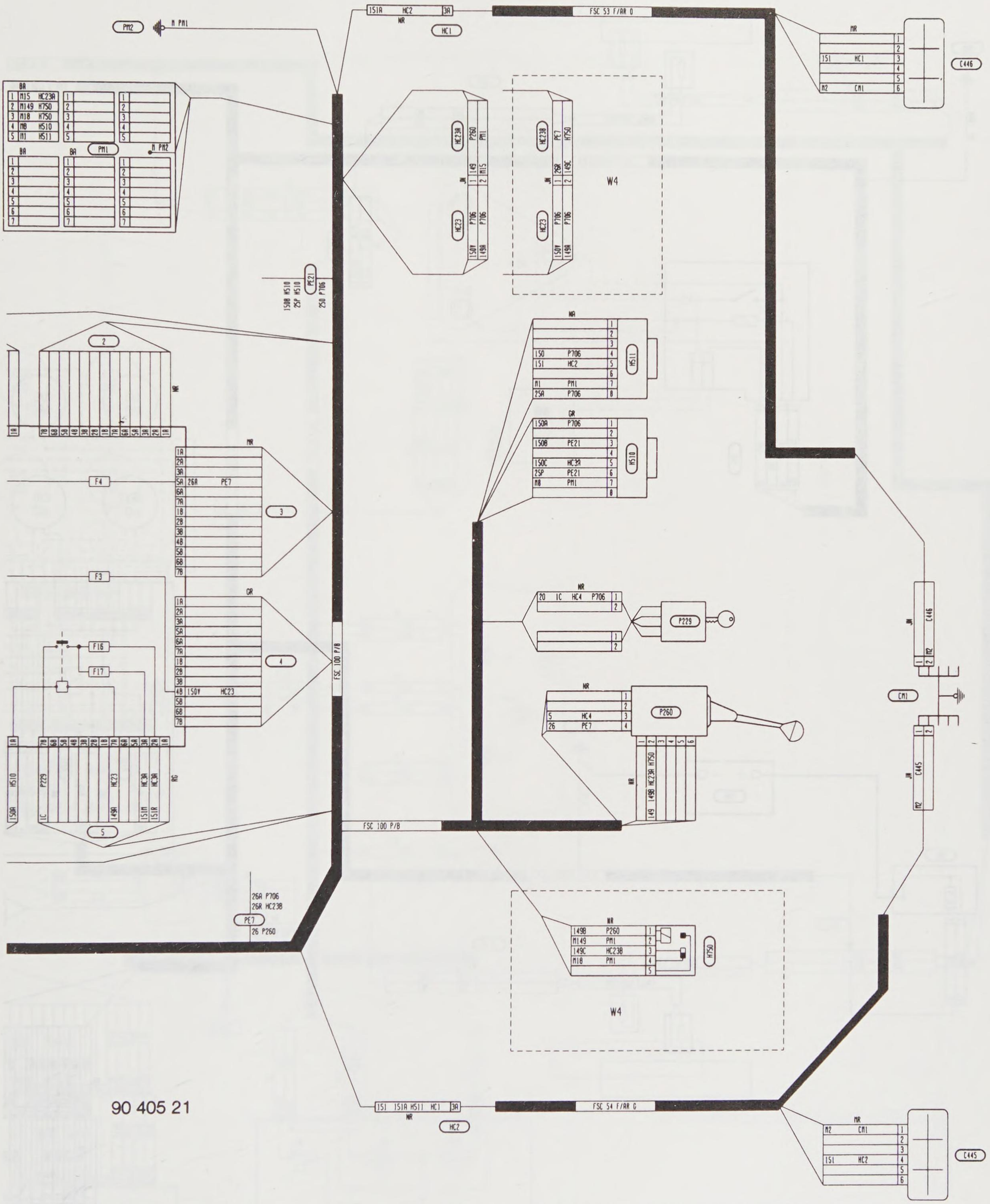
12.27 Wiring diagram for sunroof and electric windows (continued)



12.28 Wiring diagram for foglamps



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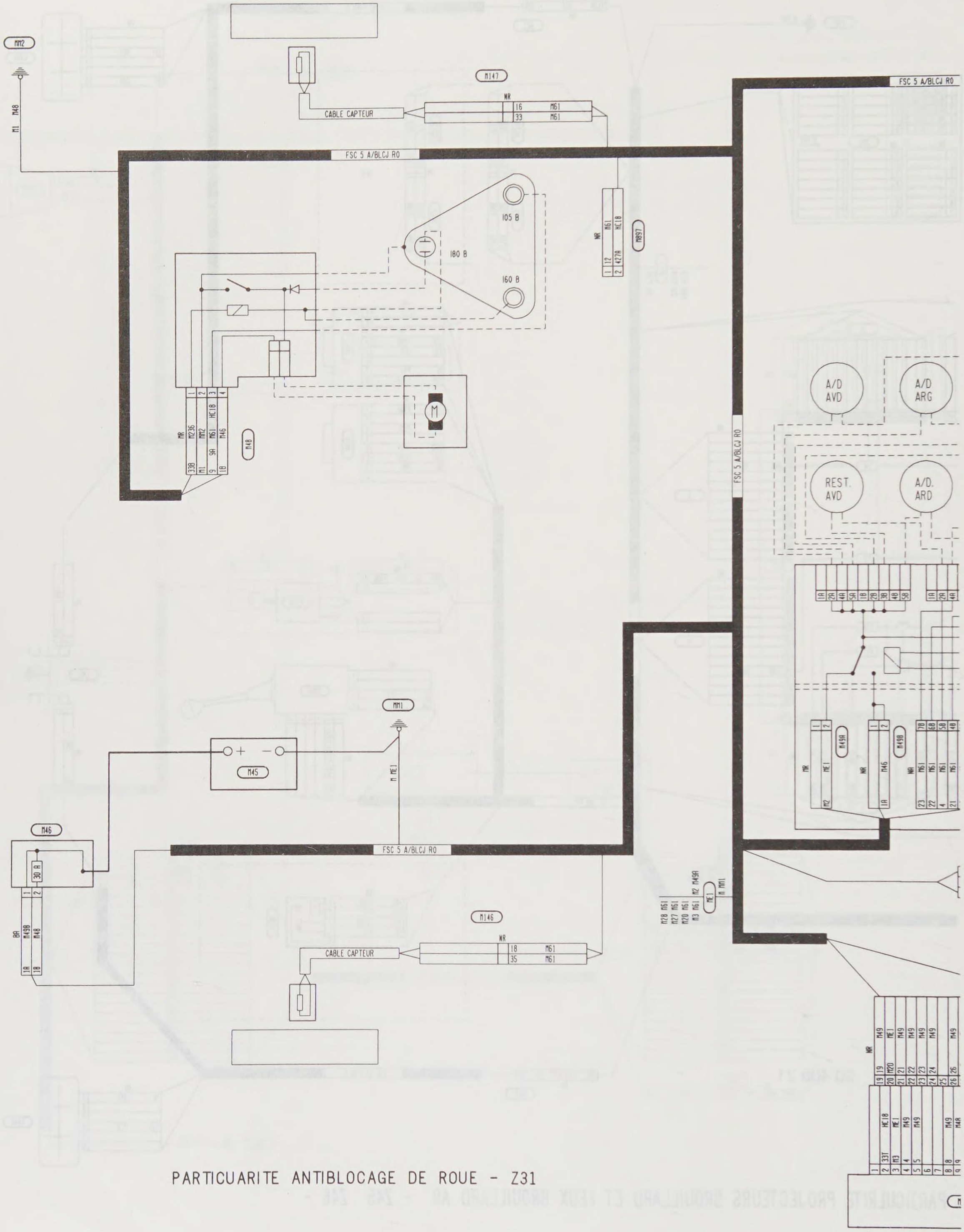
12.28 Wiring diagram for foglamps (continued)



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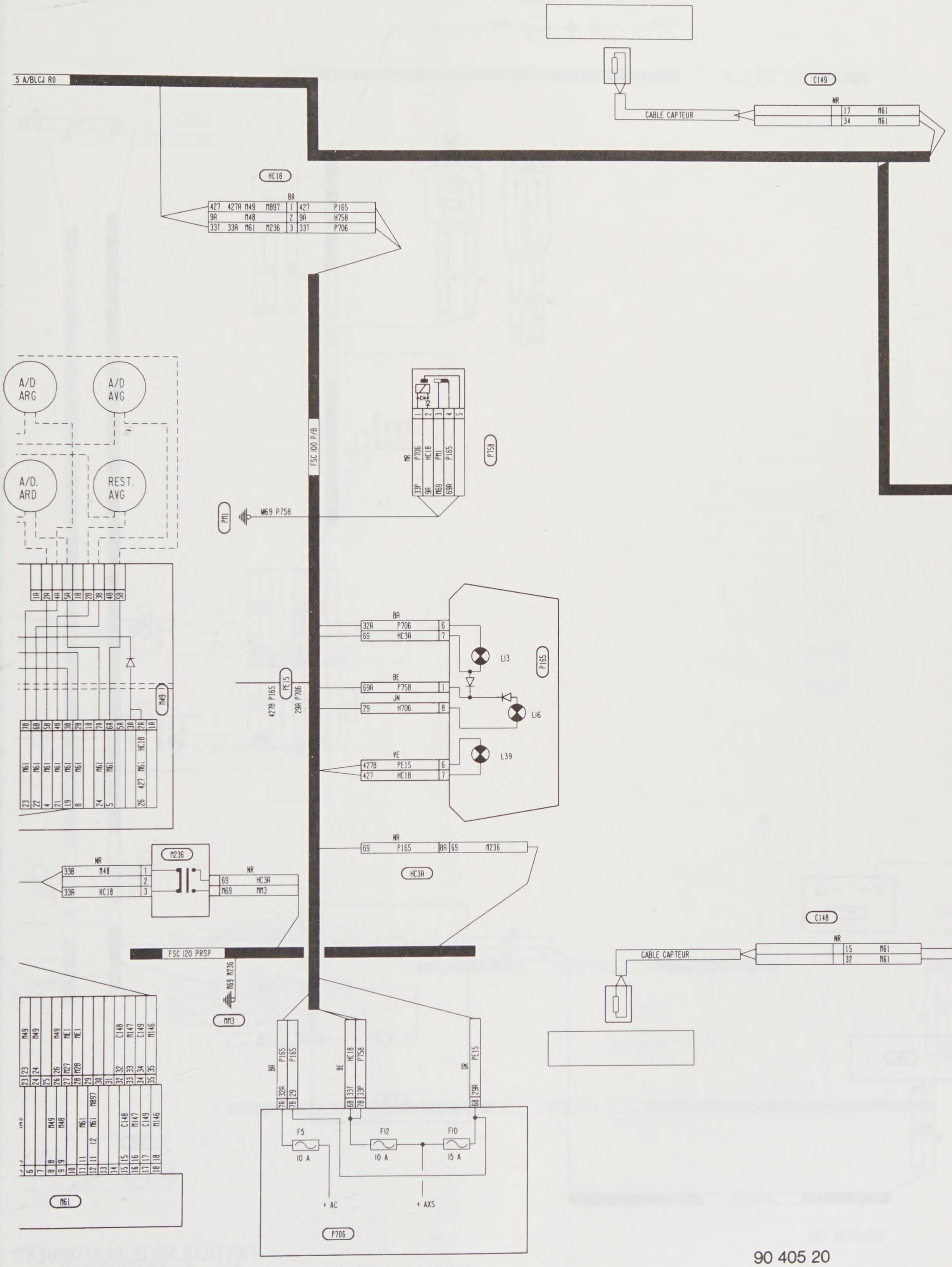
12.29 Wiring diagram for ABS



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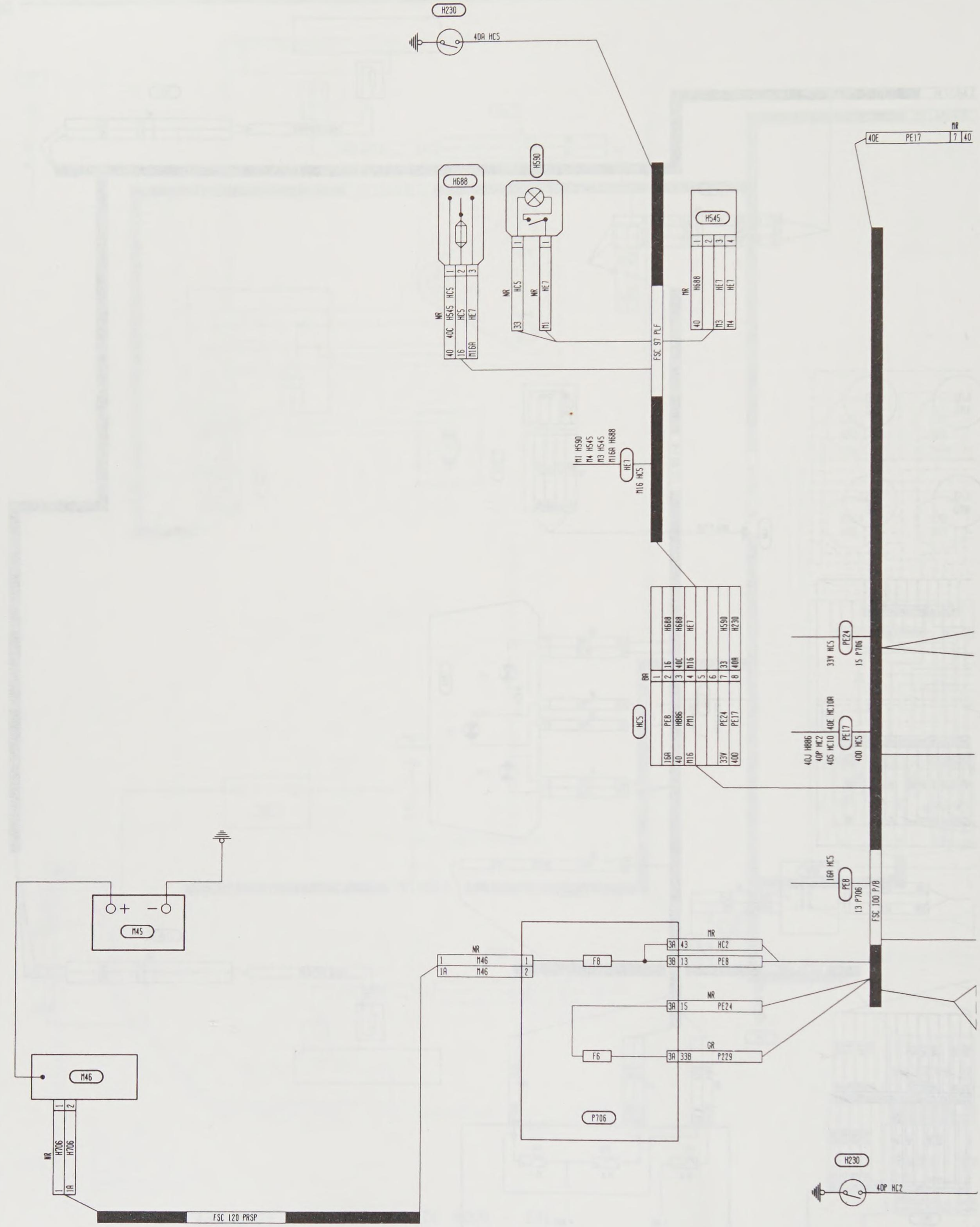
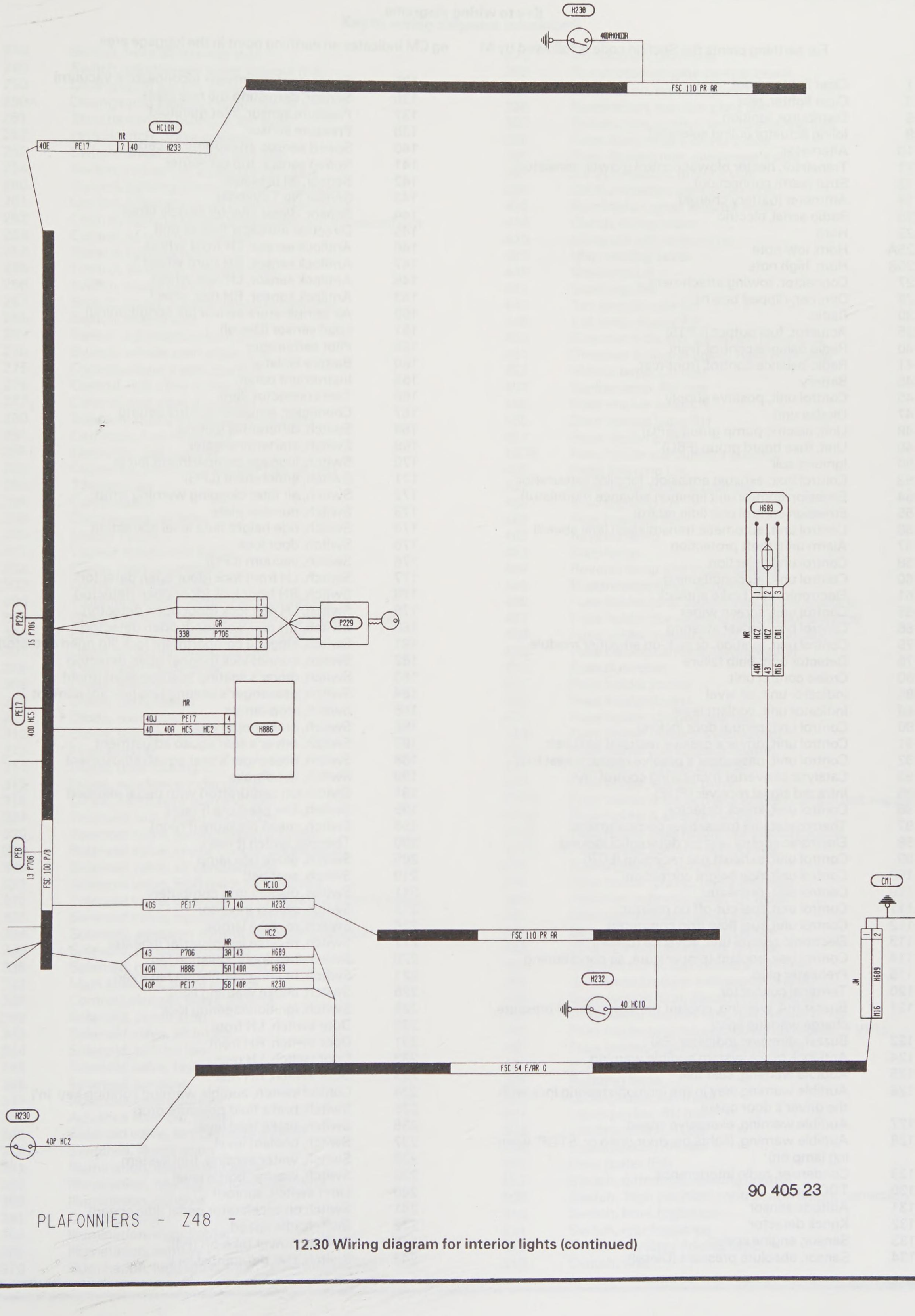
12.29 Wiring diagram for ABS (continued)



12.30 Wiring diagram for interior lights



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PLAFONNIERS - Z48 -

12.30 Wiring diagram for interior lights (continued)

Key to wiring diagrams

For earthing points the Section code is followed by M eg CM indicates an earthing point in the luggage area

1	Cigar lighter, front
3	Cigar lighter, rear
5	Distributor, ignition
9	Idling actuator (idling solenoid)
10	Alternator
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549 Diagnostic switch, diesel
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552 Switch, headlamp wiper
555 Switch, fuel supply warning light
556 Switch, police horn
557 Switch, rotating lamp
558 Switch, air fan
560 Switch, warning bell
565 Switch, pressure drop
566 Switch, air conditioning control
567 Switch, cruise control
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595 Gauge, engine oil pressure
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603 Motor, passenger's runner adjustment
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728 Relay, passive seat belt (non motorised)
729 Relay, emission control
730 Relay, starter motor
731 Relay, preheater
732 Relay, fan clutch
733 Relay, electric fan motor
734 Relay, hour meter (P4)
735 Relay, main beams
736 Relay, auxiliary driving lamps
737 Relay, dipped beams
738 Relay, heating/ventilation fan, fast speed
739 Relay, canister bleed solenoid
740 Relay, coil
741 Relay, coil resistance

Key to wiring diagrams (continued)

742 Relay, cold start control
743 Relay, compressor
744 Tachymetric relay or pump control relay
745 Relay, air horn compressor
746 Tachymetric relay (cut-off on over-run)
747 Relay, CLT
748 Relay, ECU, exhaust emission
749 Relay, cold cut-off
750 Relay, front foglamps
751 Relay, rear foglamps
752 Relay, compressor cut-out (105°)
753 Relay, pump, brake antilock
754 Relay, power circuit, brake antilock
755 Relay, headlamp wiper
756 Relay, headlamp wiper timer
757 Relay, advance curve selection
758 Relay, brake warning lamp (anti-lock brake system)
760 Relay, heated rear window
761 Relay, rear electric window
762 Relay, front electric window
763 Relay, sunroof
764 Relay, sunroof tilt and central locking
765 Relay, front screen wiper
766 Relay, rear window wiper
767 Relay, warning light occultation (P4)
768 Relay, handbrake information (ride height correction)
769 Relay, stop-light information (ride height correction)
770 Relay, accessories
771 Relay, visual warning
772 Relay, two-speed (mixture control)
773 Relay, carburettor heater
775 Relay, starter motor isolator
776 Relay, cruise control disengagement
777 Relay, pilot carburettor supply
477B Fuse holder (Lambda sensor)
778 Relay, scavenge pump
779 PTC resistance control relay
780 Relay, lighting dimmer
781 Relay, excessive speed
782 Relay, ignition supply
783 Relay, injection supply
784 Relay, trip computer/cruise control/speech synthesizer information
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786 Resistor, coil
787 Resistor, heating/ventilation fan
788 Resistor, two-speed cooling fan
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791 Heater, carburettor
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793 Resistor, preheater (P4)
794 Resistor, injection matching
795 Rheostat, instrument illumination
796 Canister simulation resistance
800 Regulator, voltage
801 Regulator, control pressure
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812 Rheostat, temperature display
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815 Rear view mirror RH
817 Heated seat, front LH
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821 Diagnostic test socket
829 Servo, power steering
830 Servo, cruise control
832 Sensor, evaporator
833 Sensor, blown air
834 Sensor, interior air temperature
835 Sensor, oil level
836 Sensor, fuel flow (trip computer)
837 Sensor, coolant level
838 Sensor, mixture regulator
840 Sensor, high temperature
841 Siren
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861 Thermal switch, 40°C (coolant temperature)
862 Thermal switch, 60°C (coolant temperature)
863 Thermal switch, 60°C (ambient temperature)
865 Thermostat, electronic (air conditioning)
866 Thermal switch, 110° (Air conditioning cut-off)
870 Thermal time switch (cold start opening)
871 Temperature switch 15 degrees (air temperature)
880 Tachograph
884 Time switch, carburettor cooling
885 Timer switch, seat belt
886 Timer switch, interior lamp
887 Timer switch, headlamp wash
888 Sender unit, oil temperature gauge
889 Temperature sender unit, injection
890 Sender unit, coolant temperature gauge
891 Temperature sender unit, electronic (heating/ventilation)
892 Sender unit, engine oil temperature
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897 Tester, anti-lock
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970 Voltmeter

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L16 Warning lamp, 'stop'
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L20 Warning lamp, screenwash level
L21 Warning lamp, coolant level
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L23 Warning lamp, brake pad wear

Key to wiring diagrams (continued)

L24	Manual test switch, instrument panel
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L39	Warning lamp, brake antilock alert
L40	Dim-dip indicator light
L41	Variable damping indicator light
L42	Coolant sensor indicator light (cooling system)
L43	Warning light, differential locking
L44	Reservoir level indicator light - ride height correction
+ AA	Supply from accessories terminal
+ P	Supply from battery
+ D	Supply from starter motor
+ AC	Supply from ignition switch
+ V	Parking light supply
M	Earth connections
BL	Screened cable

Not all items are fitted to all models

The vehicle is divided into 4 sections. Section codes are given before the component code

Sections codes

M	Engine	H	Passenger compartment
P	Facia	C	Luggage area

For connections between harnesses the Section codes, followed by C, are used to indicate where the connection is
eg MC indicates a connector between the engine and facia harnesses which is located in the engine compartment

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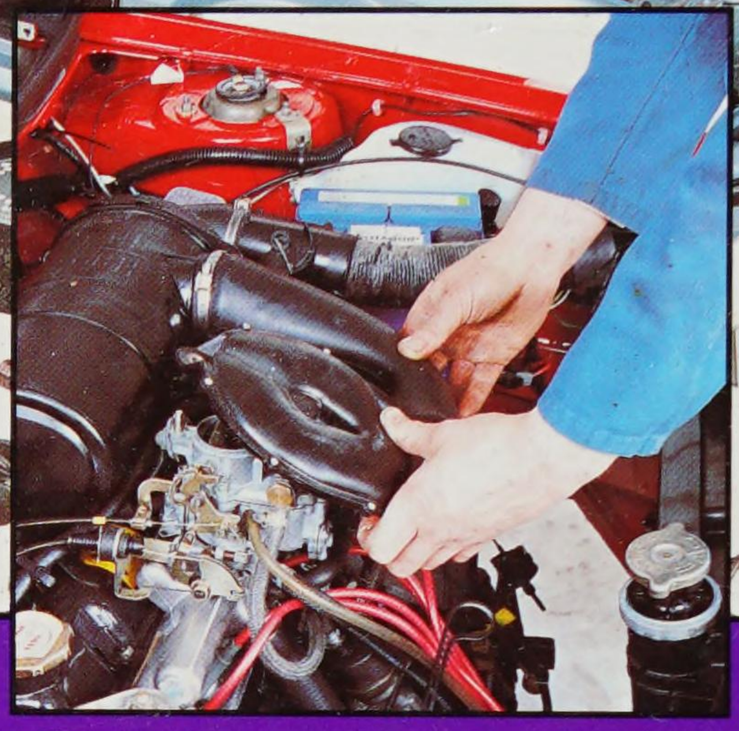

Models covered by this Manual

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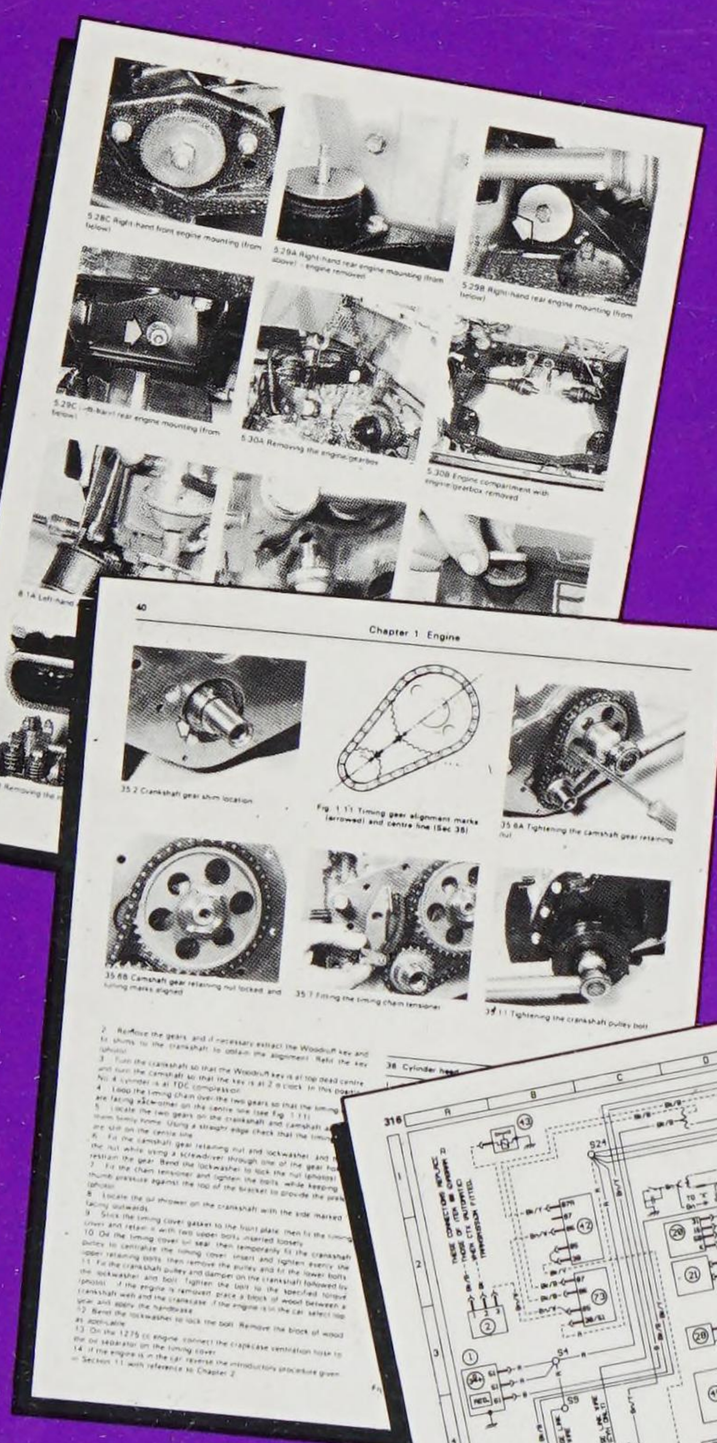

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